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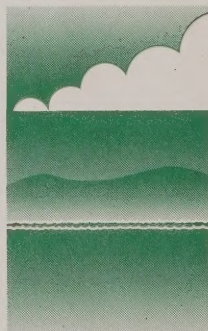
SOIL, DRINKING WATER, AND AIR QUALITY CRITERIA FOR LEAD


Recommendations
to the Minister
of the
Environment and Energy

ACES

Advisory
Committee
on Environmental
Standards

Comité
consultatif
sur les normes
environnementales





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Executive Summary

On December 3, 1993, The Honourable C.J. (Bud) Wildman, Minister of the Environment and Energy, wrote to the Advisory Committee on Environmental Standards (ACES) requesting that ACES undertake a public consultation on the proposed multimedia standards and guidelines for lead. The proposed standards and guidelines were contained in the document, *Rationale for the Development of Soil, Drinking Water, and Air Quality Criteria for Lead* (MOEE 1993) and supported by a second document, *Scientific Criteria Document for Multimedia Environmental Standards Development: Lead* (MOEE 1994). The proposed changes were a result of concerns arising from recent studies of health effects which suggest that adverse effects can occur at lead levels previously considered safe. Further, the presence of lead in food, soil, water and air have necessitated an assessment of the multiple paths of exposure to lead. This assessment represents the first in a series of multimedia documents being prepared by the Ministry of the Environment and Energy (MOEE).

Lead is a toxic heavy metal which has been used for centuries. Principal uses in the recent past have included leaded gasoline, soldered food cans, plumbing fittings, and paint. Although levels of exposure to lead have decreased significantly over the last decade largely due to the phase-out of leaded gasoline, adverse effects are observed at concentrations in the blood which are relatively low. The MOEE has estimated that approximately 4% of children in Ontario may currently be experiencing some adverse effects due to elevated blood lead levels.

As the proposed standards and guidelines are derived from a multimedia perspective, the total intake of lead, partitioned between media, must be considered. Previous single medium guidelines do not explicitly consider all sources of exposure and may be insufficiently protective. A target level of lead in blood of 10 micrograms per decilitre ($\mu\text{g/dL}$) was selected by the MOEE as the Lowest Observed Adverse Effect Level (LOAEL), a level at which learning deficits have been documented. This blood lead concentration has been identified by the Centres for Disease Control as the level at which community intervention is triggered. An Intake of Concern of the population (IOC_{pop}) of 1.85 micrograms of lead per kilogram of body weight per day ($\mu\text{g/kg/day}$) was selected. The MOEE proposes this level will protect infants between the ages of 6 months and four years by ensuring that blood lead levels are lower than 10 $\mu\text{g/dL}$ in 95% of this most sensitive population.

Partitioning the intake of 1.85 $\mu\text{g/kg/day}$ between the various media is particularly difficult since one medium, food (0.44 $\mu\text{g/kg/day}$), is not regulated by MOEE. The remaining exposures from soil, water and air, which are media regulated by MOEE, must be accommodated within the remaining 1.41 $\mu\text{g/kg/day}$. Soil has been allocated the greatest portion of exposure of these three media and is estimated to be 1.18 $\mu\text{g/kg/day}$.

ACES sought public comment on the proposed standards for lead by advertising in newspapers and by circulating a package of material containing an announcement of the consultation and background material on lead to the mailing list which ACES has developed over the last several years. Respondents received a copy of the *Rationale Document for the Development of Soil, Drinking Water, and Air Quality Criteria for Lead* (MOEE 1993) and were asked to comment on the proposed standards and guidelines. A large number of responses were received from the public, federal agencies, municipalities and industries. In response to questions regarding the acceptability of guidelines and standards, between 63 and 73% of submitters did not directly answer the consultation questions, which may reflect the complexity of the issues surrounding multimedia assessments.

ACES was generally impressed with the overall quality of the documentation, given the inherent complexity of multimedia assessments. ACES considers that the MOEE's selection of 10 $\mu\text{g}/\text{dL}$ and the Intake of Concern of 1.85 $\mu\text{g}/\text{kg}/\text{day}$ to be reasonable and appropriate in light of the most current research findings and the inherent uncertainties in the available data.

ACES supports the guidelines proposed for residential/parkland soils of 200 $\mu\text{g}/\text{g}$ and for industrial/commercial soils of 1000 $\mu\text{g}/\text{g}$. For agricultural soils, however, a number of submissions noted that historical use of lead-based pesticides has resulted in elevated levels. Application of a stringent guideline in the absence of sufficient data on current background levels in agricultural soils and on lead uptake by food crops is felt by ACES to be premature and may tend to encourage the conversion of agricultural land to residential uses. In the interim while those data are being gathered, ACES recommends an agricultural soil level of 200 $\mu\text{g}/\text{g}$, consistent with the proposed guideline for residential and parkland soils.

ACES supports the proposed Ontario Drinking Water Objective (ODWO) of 10 $\mu\text{g}/\text{L}$, but recommends a goal of moving towards the health-based criterion of 5 $\mu\text{g}/\text{L}$. Further, ACES recommends that within 5 years MOEE study the technical and socio-economic implications of lowering the ODWO to 5 $\mu\text{g}/\text{L}$.

The proposed value for the Ambient Air Quality Criterion (AAQC) of 0.7 $\mu\text{g}/\text{m}^3$ (30 day arithmetic mean) is a significant reduction from the previous criterion of 3.0 $\mu\text{g}/\text{m}^3$. The proposed criterion is based on a Best Available Technology Economically Achievable (BATEA) value for a single industry that has the greatest concentration of lead in its emissions. The health-based criterion for air, derived by the MOEE, is 0.05 $\mu\text{g}/\text{m}^3$. Although this health-based value is 14 times lower than the proposed criterion, ACES believes that the 0.05 $\mu\text{g}/\text{m}^3$ should be adopted as the AAQC. ACES acknowledges that a number of locations currently cannot meet the recommended standard and therefore recommends that the MOEE adopt an interim AAQC (30 day arithmetic mean) of 0.7 $\mu\text{g}/\text{m}^3$ for a **maximum of 3 years** and that a goal of meeting the health-based criterion of 0.05 $\mu\text{g}/\text{m}^3$ be established. During the first year, ACES recommends that the MOEE conduct a survey of available data on 30 day arithmetic mean levels of lead in air. ACES further recommends that studies of the technical and socio-economic feasibility of an AAQC of 0.05 $\mu\text{g}/\text{m}^3$ be conducted as soon as possible, and within 3 years. At the completion of these studies, ACES recommends that the MOEE re-examine the AAQC with a view to adopting the health-based criterion of 0.05 $\mu\text{g}/\text{m}^3$.

Public education activities proposed by MOEE directed towards reducing exposure to lead are strongly endorsed by ACES. ACES recommends that MOEE support targeted and broad based public education. One example of such an initiative is the "Lead Awareness Pilot Project". In order to be effective, public education campaigns must be funded over the long term and ACES recommends that the MOEE make funds available for this purpose.

ACES suggests that the MOEE work co-operatively with other jurisdictions towards reducing exposure to lead in consumer products such as paint, plumbing supplies, housewares and hobbyist's materials. ACES further recommends that the MOEE support a province-wide ban on the use of lead shot and lead fishing sinkers, since less toxic alternatives exist.

In conclusion, ACES supports the development and implementation of health-based standards and guidelines. The multimedia approach provides a rational method for determining exposure to contaminants. ACES feels that the allocation factors, which are used to partition lead to the various media, should be reviewed periodically as new data become available.

Please refer to the Summary of Recommendations section on p. 37.

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Referral

On December 3, 1993, the Honourable C.J. (Bud) Wildman, Minister of the Environment and Energy, requested that the Advisory Committee on Environmental Standards (ACES) undertake a review and consult with the public on the Ministry of the Environment and Energy's (MOEE) proposed *Soil, Drinking Water and Air Quality Criteria for Lead* (MOEE 1993). The following table lists the MOEE's current and proposed multimedia standards and guidelines for lead.

Table 1. Current, Proposed and Recommended Multimedia Standards & Guidelines for Lead

Type of Standard/Guideline	MOEE Current	MOEE Proposed	ACES's Recommended
Soil Clean-up Guideline			
- Residential/Parkland	500 ppm ¹ (µg/g)	200 ppm (µg/g)	200 ppm (µg/g)
- Industrial/Commercial	1000 ppm (µg/g)	1000 ppm (µg/g)	1000 ppm (µg/g)
- Agricultural	500 ppm (µg/g)	60 ppm (µg/g)	200 ppm (µg/g) (interim)
Ontario Drinking Water Objective	10 ppb ² (µg/L)	10 ppb (µg/L)	10 ppb (µg/L), with a goal of 5 ppb (µg/L)
Air-Ambient Air Quality Criteria (Reg. 337)			
- 30 day Ambient Air Quality Criterion (Arithmetic Mean)	3 µg/m ³	0.7 µg/m ³	0.7 µg/m ³ (interim), with a goal of 0.05 µg/m ³
- 24 hour Ambient Air Quality Criterion	5 µg/m ³	2 µg/m ³	N/A
Air-Point of Impingement Standard (Reg. 346)			
- 0.5 hour Point of Impingement	10 µg/m ³	6 µg/m ³	N/A

¹ppm-parts per million (microgram lead per gram of soil)

²ppb-parts per billion (microgram lead per litre of water)

N/A-standard not recommended but can be derived from the recommended 30 day AAQC

Recommendations on Soil, Drinking Water and Air Quality Criteria for Lead

Soil

Residential/Parkland: ACES recommends that the residential/parkland guideline for decommissioning purposes be established at 200 µg/g - the derived health-based criterion.

Agricultural: ACES recommends that an interim agricultural guideline be set at 200 µg/g, the residential health-based criterion,

until further data become available on background levels of lead in agricultural soils, lead speciation and toxicity, and lead uptake by food crops.

Industrial/Commercial: ACES supports the MOEE's proposed industrial soil guideline level of 1000 $\mu\text{g/g}$.

Water

ACES recommends that the Ontario Drinking Water Objective remain at 10 $\mu\text{g/L}$, for the time being, and that a goal of moving towards the health-based criterion of 5 $\mu\text{g/L}$ be established.

Air

ACES recommends that the Ministry adopt an interim Ambient Air Quality Criterion (30 day arithmetic mean) of 0.7 $\mu\text{g/m}^3$ for a maximum of 3 years and that a goal of meeting the health-based criterion of 0.05 $\mu\text{g/m}^3$ be established.

Other recommendations appear in the Summary of Recommendations (p. 37).

List of Acronyms

AAQC	Ambient Air Quality Criterion
ACES	Advisory Committee on Environmental Standards
BATEA	Best Available Technology Economically Achievable
C of A	Certificate of Approval
CDC	Centers for Disease Control
DWSP	Drinking Water Surveillance Program
IOC	Intake of Concern
IQ	Intelligence Quotient
LOAEL	Lowest Observable Adverse Effect Level
MOEE	Ministry of the Environment and Energy
ODWO	Ontario Drinking Water Objectives
POI	Point of Impingement

Sources of Exposure Lead is a toxic heavy metal which is ubiquitous in the environment, occurring both naturally and as a consequence of human activities. On a global scale, emissions of lead from human sources exceed those from natural sources. Lead is found in soils, sediment, surface and ground water, and air, as particulate matter. Historically, lead has been used extensively in paints, leaded crystal, glazes, dying agents, ammunition, batteries, rust inhibitors, solders in cans and plumbing, gasoline and pesticides. Exposure to lead has generally decreased over the past decade largely due to the phase-out of leaded gasoline. However, recent studies have indicated that adverse human health effects may occur at lower levels of exposure - levels which were previously considered safe.

There are many potential sources of exposure to lead through the direct ingestion of food, soil, dust and water, and the inhalation of air and dust. Absorption through the skin is thought to be negligible.

Potential Health Effects of Lead

Lead exposure can affect the reproductive, renal, cardio-vascular, blood forming and central nervous systems. One of the sensitive subpopulations at risk is young children as they have a greater daily intake of lead through ingestion and absorb lead more efficiently, on a body weight basis, than adults. Once ingested or inhaled, lead may be stored in the body, primarily in bone tissue.

Measurement of lead in the blood has commonly been used to link an individual's exposure to adverse effects. Blood lead levels provide an indication of recent lead exposure. Studies have demonstrated that behavioral effects and learning deficits may occur at blood lead levels which were previously regarded as safe. The scientific community acknowledges that no threshold value exists for lead and adverse effects may occur at any level of exposure.

ACES's Overview of Proposed Standards

The *Rationale for the Development of Soil, Drinking Water and Air Quality Criteria* (MOEE 1993) along with the *Scientific Criteria Document for Multimedia Environmental Standards Development - Lead* (MOEE 1994) contain recommendations and proposals for two different kinds of activities relating to the management of lead exposure in Ontario. The documents propose standards for regulating lead in air, drinking water and soils and also make suggestions for non-regulatory initiatives, such as activities by individuals and groups, which can reduce their exposure to lead.

The documents' proposals for revised standards, along with the current standards, are presented in Table 1. The proposed lead

standards are based on a reassessment of the adverse human health effects of lead and embody a multimedia approach to standard setting.

The Nature of the Proposed Standards: The Multimedia Approach

The proposed standards are the first in a series being prepared by the MOEE which are based on a multimedia approach. The multimedia approach considers all sources (media) of exposure including food, air, drinking water and soil, simultaneously when setting standards. The primary objective of the multimedia approach is to develop a set of environmental standards which ensures that total exposure from all sources does not exceed a level which would present an unacceptable risk to human health or the natural environment. In contrast, standards based on a single medium assessment do not explicitly consider all sources of exposure and may be insufficiently protective.

MOEE's derivation of the proposed standards reflects the fact that the Ministry of the Environment and Energy, in particular, and the Provincial government, more generally, do not have jurisdiction over all the areas which are necessary to control environmental exposure to lead. For example, the Ministry of the Environment and Energy does not have regulatory control over the lead content of the foods that are sold or consumed in Ontario.

ACES's Summary of the MOEE's Approach

This section provides a brief overview of ACES interpretation of the approach used by MOEE to derive the proposed standards for lead.

MOEE's proposed standards begin with the objective of protecting the most sensitive receptor, identified as infants and young children. While noting that no threshold level (i.e., a level of exposure below which no adverse health effects are observed) has yet been identified for lead, the MOEE identifies a blood lead level of 10 micrograms per decilitre ($\mu\text{g/dL}$) as the Lowest Observed Adverse Effect Level (LOAEL) for children. At or above this level, learning deficits in children, including reduced Intelligence Quotient (IQ), can be observed. The MOEE states that even a minor reduction in IQ will, over time, result in a two fold increase in children with an IQ lower than 70 (mentally retarded), and decrease in the number of children in gifted categories.

MOEE then estimates that a total daily intake of 3.7 micrograms of lead per kilogram of body weight per day ($3.7 \mu\text{g/kg/day}$) is the total

lead intake (from all media) that would result in a blood lead of 10 $\mu\text{g}/\text{dL}$. This was divided by an "uncertainty factor" of 2 to derive the intake of concern for the population (IOC_{pop}) of 1.85 $\mu\text{g}/\text{kg}/\text{day}$. MOEE considers that keeping the average intake at or below this 1.85 level will ensure that the vast majority of the population has blood lead levels below 10 $\mu\text{g}/\text{dL}$.

The health-based criteria for drinking water, air and soil are then derived by allocating a "share" of the IOC_{pop} to each of these media. The "share" sets the maximum allowable intake of lead through each medium which would result in 1.85 $\mu\text{g}/\text{kg}/\text{day}$ of lead. Since MOEE does not regulate the quantity of lead in food, MOEE begins the allocation amongst media with an assumption of what the intake of lead through food is likely to be. MOEE estimates the figure to be 0.44 $\mu\text{g}/\text{kg}/\text{day}$ of lead through food, which is 24% of 1.85. MOEE then divides up the remaining 76% based on current lead intake levels, with the soil allocation set at 64% (1.18 $\mu\text{g}/\text{kg}/\text{day}$), water at 12% (22 $\mu\text{g}/\text{kg}/\text{day}$) and air at less than 1%.

It should be noted that the share for each medium is based upon the assumption that all of the other media are at their maximum allowable levels and there is no transfer of lead between media.

MOEE then derives the health-based criteria (the concentrations of lead allowable in each medium) by applying the assumed consumption of each of the media -- the quantity of soil ingested, the amount of water consumed, the quantity of air inhaled -- to the percentage share allocated to the medium. This results in figures of 200 micrograms of lead per gram of soil ($\mu\text{g}/\text{g}$) for residential soil, 5 micrograms per litre ($\mu\text{g}/\text{L}$) for drinking water and 0.05 micrograms per cubic metre ($\mu\text{g}/\text{m}^3$) for air.

MOEE then derives the standards which it is now putting forward for each of the media. MOEE proposes that the residential soil figure be set at 200 $\mu\text{g}/\text{g}$, the same as the health-based criterion. This constitutes a 60% decrease from the current standard.

MOEE proposes that the standard for drinking water remain at 10 $\mu\text{g}/\text{L}$, pending studies of the technical and economic feasibility of achieving 5 $\mu\text{g}/\text{L}$ in those water systems where corrosive water leaching lead into the plumbing system is a particular problem.

As for the air standards, MOEE recommends an ambient level of 0.7 $\mu\text{g}/\text{m}^3$, a decrease of more than 75% from the present level, but still

above the $0.05 \mu\text{g}/\text{m}^3$ health-based criterion. The figure of $0.7 \mu\text{g}/\text{m}^3$ is MOEE's estimate of the level economically achievable by a secondary lead smelter which is currently Ontario's largest source of air lead emissions.

Potential Effect of the Proposals

MOEE estimates that under the current standards an individual exposed to the maximum allowable in each of the media would have, on average, a blood lead level of about $11 \mu\text{g}/\text{dL}$. Under the proposed standards, an individual similarly exposed to the maximum allowable in each of the media would likely have a blood lead of about $5.9 \mu\text{g}/\text{dL}$.

MOEE notes, however, that the application of the proposed standards would not result in significant changes to individual exposure in the short term, in particular because the residential soil level does not regulate allowable levels in residential soils across the province. The residential soil figure applies as a guideline in the decommissioning context when changes to land use patterns (for example industrial to residential uses) are proposed.

Activities Not Related To Standard Setting and Enforcement

In this context MOEE notes that other activities will be required to decrease individual exposure to lead, especially in the short term. The MOEE documents set out a number of non-regulatory initiatives, such as education of the public, to reduce individual exposure through personal and community avoidance strategies. This includes a range of initiatives, for example flushing the standing water from plumbing systems prior to use for drinking water.

ACES's Review: Some Considerations

Prior to presenting details of the public review of the MOEE proposals, it will be useful to set out some of the considerations which have influenced ACES's review of the public comments:

- There has been a steady decline in the level of lead exposure generally considered safe by the scientific community.
- Lead is probably the most studied environmental contaminant. Nonetheless, significant uncertainty remains about a number of issues, including safe levels of exposure, the quantities of lead

taken in through the different media and lead uptake rates by individuals.

- There appear to be potentially significant socio-economic impacts associated with the implementation of more stringent lead standards. However, data on these impacts are sparse.
- In the present context, strategies which target specific groups are likely to be the most effective in addressing negative health effects associated with lead exposure. These groups include infants and children as well as communities and individuals with elevated blood lead levels or known elevated lead exposures.
- The proposed standards are the first to be based on a multimedia approach. Accordingly, a number of issues peculiar to that approach, such as the appropriate "share" allocated to each medium, arose for public review for the first time.
- ACES emphasizes the protection of public health and the environment in the face of uncertainty when regulating environmental contaminants. ACES emphasizes the importance of targeting and achieving health-based standards and supports the use of a multimedia approach to standard setting. ACES recognizes that socio-economic considerations are relevant in determining the strategy and overall pace for implementing environmental standards.
- ACES has restricted the scope of its recommendations to the proposed lead standard. Several suggestions from the public recommended changes which would alter the underlying Ontario regulatory framework beyond the lead standard itself - such as a two-tiered system for the implementation of the soil guidelines. ACES is of the view that consideration by MOEE and a public review of the regulatory framework are preconditions to ACES's assessing recommendations which have implications beyond the lead standard.

ACES's Preliminary Review

Upon receipt of the *Rationale for the Development of Soil, Drinking Water and Air Quality Criteria for Lead* (which deals with risk management and policy issues) and the companion report *Scientific Criteria Document for Multimedia Environmental Standards Development - Lead* (which provides a risk assessment for lead), ACES reviewed these documents and concluded that they were complete for public consultation purposes.

Public Consultation Process

In order to solicit public comment, direct mailing as well as broad advertising campaigns were launched on January 10, 1994. In addition to ACES's general mailing list, which contained about 6,600 individuals and groups from previous ACES consultations, a targeted mailing list was compiled which included 290 individuals and organizations specifically interested in lead issues. A package of material (Appendix 1) announcing the consultation along with background material on lead was sent to the general and targeted mailing lists in the week of January 10 -14, 1994. As a cost saving measure, consultation materials on the MOEE's proposed Interim Ontario Drinking Water Objective for Tritium were distributed in the same package and the two consultations were undertaken concurrently. In the third and fourth weeks of the consultation, a follow-up letter was sent to those individuals and groups on the targeted mailing list who had not responded to the first mail out, as a reminder of the consultation and to encourage their participation.

Coupled with these direct mailings, advertisements appeared in 19 daily newspapers throughout the province during the week of January 10 -14, 1994 and in STARweek magazine (the Toronto Star's weekly TV magazine) on January 15, 1994. An advertisement also appeared in the Ontario Gazette on January 8, 1994 and on the Web Network on January 10, 1994. (The Web Network is an electronic communications network to which many different organizations including many environmental groups from around the world, subscribe.)

The questions posed in the mail out materials and in the advertisements were as follows:

1. Are the proposed standards acceptable?
2. If not, what is the basis for finding the proposed levels unacceptable?

3. Do you have alternative levels to propose?

Any additional comments were also encouraged.

The MOEE's *Rationale for the Development of Soil, Drinking Water and Air Quality Criteria for Lead* was distributed to the public upon request. The MOEE's *Scientific Criteria Document for Multimedia Environmental Standards Development - Lead* was available for review at all District and Regional Offices of the MOEE and at the ACES office at 40 St. Clair Ave. West, Toronto.

Requests for oral deputation meetings were received until February 7, 1994. On March 3, 1994, an afternoon and evening Deputation Session was held in the MacDonald Block, Queen's Park in Toronto. On March 10, 1994, phone-in deputation sessions were held where members of the public in other areas of the Province could deliver their comments, orally, to ACES members. A total of 7 oral presentations were made to ACES. All deputations were audio taped for use by ACES members. All presenters were encouraged to submit their comments in writing prior to the end of the consultation period.

The deadline for written comments was April 11, 1994. Comments received after the deadline were considered but their inclusion in ACES's report to the Minister of Environment and Energy was not guaranteed.

All comments received during the 90 day public consultation period were collected under the *Freedom of Information and Protection of Privacy Act*. Comments from individuals remained anonymous unless consent was granted for the attribution of comments. Comments received from organizations were attributed and, upon request by members of the public, all comments were made available (for viewing purposes only) at the ACES office in Toronto.

Requests for ACES's public consultation materials and/or technical documents numbered about 750. A total of 115 written submissions was received from individuals and groups within the official comment period. A list of respondents appears in Appendix 2 and summaries of these comments appear in Appendix 3.

Review of Public Comment

In reviewing the written material and comments presented at the Deputation Meetings, every response was considered carefully. All comments, whether written or oral, were equally weighted during ACES's deliberations. The nature of the comments ranged from very brief to detailed technical submissions with critical research papers appended for ACES's attention. The public raised a number of issues of which ACES was not previously aware.

The majority of respondents felt that the implementation of more stringent standards for lead was a positive measure to reduce overall human exposure to lead. Many respondents commented favourably on the overall quality of the documentation with respect to its accessibility to the lay person. However, many submissions raised concerns about the assumptions and databases used in the derivation of the proposed standards. Many respondents addressed issues relating to more than one standard and/or medium.

Issues were categorized and are discussed in the report as follows:

- 1.0 Overview of Public Response Concerning the Proposed Levels
- 2.0 Application and Enforcement of Standards
- 3.0 Risk Assessment
 - Derivation of the Intake of Concern
 - Derivation of the Health-Based Criterion
- 4.0 Public Education
- 5.0 Government Actions Concerning Consumer Products
- 6.0 Medium-Specific Issues
 - Soil Clean-up Guidelines
 - Ontario Drinking Water Objective
 - Ambient Air Quality Criteria
- 7.0 Other Issues

1.0 Overview of Public Response Concerning the Proposed Levels

In the consultation materials, ACES posed three questions (refer to p. 9) concerning the acceptability of the proposed levels in soil, water and air. Responses to these questions are summarized in Table 2.

TABLE 2. Summary of Public Response Concerning the Proposed Levels

Comment	Residential/ Parkland	Industrial/ Commercial	Agriculture	Drinking Water	30 Day AAQC	24 hour AAQC	8.5 hr. POI
Yes, the proposed standard is acceptable	27 (23%)	26 (23%)	26 (23%)	29 (25%)	27 (23%)	28 (24%)	27 (23%)
No, the proposed standard is not acceptable - it should be lower	3 (2.6%)	10 (8.7%)	3 (2.6%)	10 (8.7%)	4 (3.5%)	3 (2.6%)	3 (2.6%)
No, the proposed standard is not acceptable - it should be higher	7 (6.1%)	1 (<1%)	13 (11.3%)	0 (0)	2 (1.7%)	1 (<1%)	1 (<1%)
Question not answered directly	78 (68%)	78 (68%)	72 (63%)	78 (68%)	82 (71%)	83 (72%)	84 (73%)
Total Comments Received	115 (100%)	115 (100%)	115 (100%)	115 (100%)	115 (100%)	115 (100%)	115 (100%)

Although the majority of respondents did not answer the consultation questions directly, trends emerged from those respondents who commented on the proposed levels. Many respondents welcomed stricter environmental standards for lead and, in general, approved of the proposed levels in all media. Two commenters suggested that zero discharge or that a proposed standard of zero is the only truly acceptable level. Another 5 submissions supported maintaining the current standards and indicated that revisions at this time were not warranted.

Of those commenters who did not find the proposed soil guidelines acceptable, more commenters suggested that the Residential/Parkland guideline should be higher (many of whom suggested that it remain at its current level), the Industrial/Commercial guideline should be lowered and the Agricultural guideline should be higher.

All of the 10 respondents who indicated that the Ontario Drinking Water Objective of 10 µg/L was unacceptable suggested that the number should be reduced, most of these recommended the desirable health-based criterion level of 5 µg/L.

Six respondents indicated that the 30 day Ambient Air Quality Criterion (AAQC) was unacceptable - two suggested that it should be higher. The other air quality standards (24 hour AAQC and 0.5 hour Point of Impingement (POI)) were not supported by zero discharge proponents.

2.0 Application and Enforcement of Standards

2.1 ACES's Understanding of MOEE's Proposals

Soil: The MOEE states that the revised soil guidelines are not to be considered values which, when exceeded, trigger clean-up. They are to be applied within the context of the Ministry's Decommissioning Policy, and in spill situations where clean-up is required in the absence of full-scale decommissioning. The soil is remediated to a quality which is consistent with anticipated land use of the site. The majority of decommissioning activities in Ontario are due to land use changes for redevelopment. The MOEE uses soil clean-up guidelines to provide advice on the soil quality required for the intended new land use. As well, soil clean-up guidelines were used in the special case of the South Riverdale community. A soil removal program was undertaken in 1987-88 (based on a soil clean-up trigger level of $>500 \mu\text{g/g}$ soil lead) in neighbourhoods where children had elevated blood lead levels.

Water: The Ontario Drinking Water Objectives (ODWO) are the primary criteria used for assessing the quality of drinking water in Ontario. The MOEE sets ODWOs as conditions which must be met in Certificates of Approval, issued prior to construction or alteration of, for example, a water treatment facility. ODWOs are also used by the local Medical Officer of Health to determine whether water is safe for human consumption. The ODWO for lead applies to free flowing water at the consumer's tap, unlike other ODWOs which apply to drinking water as it leaves the water supply plant.

Air: Point of Impingement (POI) standards are the main enforcement tools for air emissions used by the MOEE. POI standards are used as part of the Certificate of Approval process to approve new emission sources. POI standards (generally applied at the borderline of the property being regulated) are based on modelling using known or predicted emission rates for a contaminant. Ambient Air Quality Criteria (AAQC) are desirable air quality criteria and are used in the assessment of general air quality, environmental assessments and the evaluation of MOEE's air management programs. POI and AAQC

are empirically linked using an air model - the 0.5 hour POI standard is set so that the 24 hour and 30 day AAQC are not exceeded.

2.2 Response by Public

A total of 10 respondents questioned how the standards would be implemented and enforced. One respondent indicated that the revised set of environmental standards should be accompanied by a monitoring requirement to demonstrate the effectiveness of the standards and those that are ineffectual should be discontinued.

A number of concerns were raised with respect to the soil clean-up guidelines. Inconsistencies between lead levels specified in the MOEE's Proposed Materials Management Policy (i.e., Inert Fill - 45 $\mu\text{g/g}$) and Compost Guidelines (150 $\mu\text{g/g}$) and the potential for an increase in material which will be landfilled were identified.

Comments were received on the issue that the overall exposure of children to lead from soil will not be reduced in the short term since the soil clean-up guidelines only apply to clean-up within the decommissioning context and selected residential soils will remain highly contaminated unless the land is rezoned. Two respondents indicated that a more effective approach would be to apply two sets of standards, one at a higher level to trigger clean-up and a lower level towards which the clean-up should be directed. Some commenters indicated that, even if the soil guidelines are intended to be used only by the MOEE within the Decommissioning Policy, these numbers may be applied unofficially as reference values for "clean" soils by other agencies and individuals which could have significant legal and social implications.

The application of the agricultural guideline was questioned by many commenters and concerns were raised that Ontario's existing farmland may be deemed unsuitable for agricultural purposes if the proposed standard is implemented. Also of concern was the impact on the consumers' perception of whether Ontario produce was safe for consumption if foods had been grown in soils which exceed the proposed guideline. Since the agricultural guideline is rarely applied (i.e., industrial/commercial or residential/parkland being rezoned to agricultural) many commenters suggested that this standard may in fact do more harm than good to Ontario's agriculture industry.

With respect to the proposed ODWO for lead, one commenter suggested that this number be applied as a "standard" rather than an "objective" so that there is statutory authority to require compliance.

Two submissions questioned the application of the air standards. One commenter suggested that monitoring at point sources throughout the province is not necessary given that the MOEE can control emissions through the Certificate of Approval (C of A) process. Another submission stated that the range of federal and provincial air emission standards and their inconsistent derivation are confusing and it is virtually impossible to compare emission standards, nationally and internationally.

2.3 Response by ACES

ACES considered that the application of the proposed standards was an important factor in assessing the overall acceptability of the standard. In the case of the soil clean-up guidelines, MOEE's revised Decommissioning Guideline and associated policies have yet to be distributed for comment and review. ACES was therefore unable to comment on specific details which would be addressed by those policies. ACES did, however, share the public's concern that the multitude of lead standards and their specific application (e.g., Materials Management Policy, Sludge Guidelines, Compost Guidelines) is confusing and there is potential for misuse by agencies other than the MOEE.

ACES acknowledges that the soil clean-up guidelines are largely being applied for redevelopment purposes at specific sites and are not targeted at high risk areas. ACES considered commenters' suggestions of a two-tiered approach which would mandate cleanup. Mandatory cleanup would begin at a trigger level and cleanup would be undertaken to achieve a specified standard. This standard would be set below the trigger level to reduce the possible need for subsequent cleanups. However, the scope of the resulting remediation is uncertain and the costs potentially high. ACES is of the view that this change in regulatory framework could not be recommended in the absence of review and comment by the MOEE and by public.

The public raised the concern that the agricultural soils guideline might be the source of misperceptions of the quality of Ontario farmland and Ontario produce. ACES considers this to be an issue of concern, since the guideline appears to play a negligible role in the regulation of agricultural soil quality.

The comments and concerns expressed by the public relating to the application and enforcement of the proposed standards within the existing soil, water and air regulatory framework are very important and should be addressed by the MOEE.

2.4 ACES's Recommendations

ACES recommends that the MOEE review the lead guidelines within its proposed Decommissioning and Materials Management Policies, Sewage Guidelines and Compost Guidelines with a view to addressing potential inconsistencies.

3.0 Risk Assessment

3.1 Derivation of the Intake of Concern (IOC)

3.11 ACES's Understanding of MOEE's Proposals

The blood lead level of 10 micrograms per decilitre ($10 \mu\text{g/dL}$) was identified by MOEE as the Lowest Observed Adverse Effect Level (LOAEL) for children. MOEE documentation states that the goal of lead exposure prevention and actions should be, at minimum, to reduce children's blood lead levels below $10 \mu\text{g/dL}$. However, MOEE cautions that $10 \mu\text{g/dL}$ should not be regarded as an acceptable level or a level below which no effects occur since no threshold for critical effects has been scientifically established.

The daily intake of lead which would result in a blood lead of $10 \mu\text{g/dL}$ was then estimated. In doing so, MOEE employed a value of 0.21 to estimate, on average, the portion of ingested lead which is taken up in the blood. Using this value yielded an estimated intake of 3.7 micrograms of lead per kilogram of body weight per day ($3.7 \mu\text{g Pb/kg/day}$) corresponding to a blood lead level of $10 \mu\text{g/dL}$.

MOEE then identified the average daily intake for the population which would present a low risk to children's health. This was defined as the intake of concern for the population (IOC_{pop}) and was set at 1.85 micrograms of lead per kilogram of body weight per day ($1.85 \mu\text{g Pb/kg/day}$), dividing the 3.7 micrograms by an "uncertainty factor" of 2. It was set so that the great majority (more than 95%) of children exposed to the daily intake will have blood lead levels lower than $10 \mu\text{g/dL}$. It is also a level which, it is estimated, would keep the blood levels of more than 99% of exposed children below $15 \mu\text{g/dL}$ (this is the level identified by the Centres for Disease Control as the trigger for individual intervention). This IOC_{pop} should also protect adults, including pregnant women, and the foetus.

3.12 Response by the Public

A wide range of responses on the derivation of the Intake of Concern were received. Comments focussed on the selection of the blood lead level of concern (i.e., $10 \mu\text{g/dL}$) and its association as a LOAEL, the use of 0.21 to estimate the portion of ingested lead taken up in the

blood, the application of an uncertainty factor of 2 and the resulting appropriateness of the derived IOC. Two commenters suggested that an X-ray fluorescence technique be used to measure lead levels in bone tissue, which is more representative of long-term lead exposure than blood lead measurements.

Some commenters indicated that the IOC was too stringent due to conservative assumptions that were used in its calculation. Five respondents suggested that the IOC was too high given that there is no threshold for adverse health effects from lead while three indicated that the IOC was too low since some jurisdictions (e.g., World Health Organization) use a blood lead target level of 15 $\mu\text{g}/\text{dL}$ as an intervention level. One concern that was expressed by three of the respondents was the fact that lead from soil, once ingested, will be absorbed and assimilated into the human body much differently than infant's liquid diet. The latter was the basis of the estimate, used in the calculation of IOC, that 0.21 of ingested lead is taken up by the blood. The concern, therefore, is that blood lead resulting from ingested soil is overestimated using this approach. Some respondents indicated that the "uncertainty factor" of 2 should be closer to 10 as in many other risk assessments, while one commenter suggested an uncertainty factor of 1.4, which is consistent with another jurisdiction's assessment.

3.13 ACES's Discussion

After examining the Rationale and Scientific Criteria Documents in detail to investigate the nature of the above concerns and after discussing them and ACES's understanding of the derivation of the IOC with MOEE staff, ACES came to the conclusions set out below. In drawing these conclusions, ACES acknowledges that a number of areas of uncertainty exist and that MOEE's Rationale Document may not always clearly describe the steps taken or background data on which assumptions are made. However, the information presented to ACES in the course of the public consultation did not provide "better" alternatives which would reduce the overall uncertainty in the LOAEL and the estimation of the Intake of Concern.

First, ACES is persuaded that 10 $\mu\text{g}/\text{dL}$ is a reasonable estimate of the LOAEL, given the most recent research on the relationship between blood lead levels and adverse effects. It is ACES's understanding that this more recent research may not be reflected in the higher levels suggested by the World Health Organization.

Secondly, ACES is of the view that it is appropriate to set the intake of concern so that a significant majority of children exposed to it will have blood lead levels below the LOAEL. This is especially the case since no threshold has been established and the historical trend for LOAEL estimates has been consistently downwards.

Thirdly, ACES has concluded that, given the nature of the data, the adoption of a value of 0.21 for the relationship between ingested lead and blood lead and an "uncertainty factor" of 2 yield a reasonable estimate of the intake of concern for the population.

Finally, ACES recognizes that this level of average exposure, even if nowhere exceeded, will not protect every child from adverse effects. The estimated IOC_{pop} is based on average rates of uptake and, implicitly, on average sensitivities to blood lead levels. A regulatory approach which aims at keeping exposure below this level should be combined with a strategy of individual intervention, education in cases where blood leads are at or above $10 \mu\text{g/dL}$ or where adverse effects are observed at blood lead levels below $10 \mu\text{g/dL}$.

3.14 ACES's Recommendations

ACES considers that the MOEE's selection of the LOAEL blood lead level of $10 \mu\text{g/dL}$ and the Intake of Concern of $1.85 \mu\text{g/kg/day}$ to be reasonable and appropriate in light of the most current research findings and the inherent uncertainties in the data.

3.2 Derivation of Health-Based Criteria

3.21 ACES's Understanding of MOEE's Proposals

The MOEE derives the health-based criteria for soil, drinking water, and air by allocating a "share" of the IOC_{pop} to each of these media. The "share" sets the maximum allowable intake of lead through each medium which would result in $1.85 \mu\text{g/kg/day}$ of lead. It should be noted that the share for each medium is based upon the assumption that exposure to all of the other media are at their maximum allowable levels.

MOEE chose to base its share allocation on estimates of current levels of lead intake by children through each of the media. Since MOEE does not regulate the quantity of lead in food, MOEE began the allocation amongst media with an assumption of what the intake of lead through food is likely to be. Because the level of dietary intake of lead may have declined since the 1985 food survey data (which was prior to the phase-out of lead in gasoline and in the food

canning industry), recent American dietary intake trend data were applied to Ottawa baseline data to estimate 1993 exposure. The estimated lead intake from food for children was calculated to be 6 $\mu\text{g}/\text{day}$. Based on a body weight of 13 kg this corresponds to about 0.44 $\mu\text{g}/\text{kg}/\text{day}$ of lead through food, which is 24% of the IOC_{pop} of 1.85.

MOEE then derives the health-based criteria (the concentrations of lead allowable in the various media) for each of the remaining media by applying the assumed intake of each medium - the quantity of soil ingested, the amount of water consumed, the quantity of air inhaled - to the percentage share allocated to the medium. As noted, the percentage allocated to each medium was based upon estimates of current lead intake through soil, water and air. Average media intake rates and average lead levels in each of the media were used to derive allocation percentages of 64% for soil, 12% for water and less than 1% for air.

As for consumption levels, soil and dust exposures were estimated using observed data on soil lead levels and by assuming that children ingest an average of 80 milligrams of soil/day. Intake from drinking water and air were based on a consumption estimate of 0.6 L for children age 1-4 and a contact rate of 5 m^3/day , for water and air, respectively. Combining these intake figures with observed lead levels in the various media results in lead intake estimates of 16 $\mu\text{g}/\text{day}$ for soil/dust, 3 $\mu\text{g}/\text{day}$ for water, and 0.14 $\mu\text{g}/\text{day}$ for air.

Health-based criteria for soil, water and air are derived by assuming a body weight of 13 kg (except in the case of Industrial/Commercial soils which assumes a 70 kg body weight, since it is based on adult occupational exposure), applying allocation factors and consumption rates specific to each medium. The IOC_{pop} level is equivalent to about 24 $\mu\text{g}/\text{day}$ for a 13 kg child. This results in health-based criteria of 200 $\mu\text{g}/\text{g}$ for residential soil, 5 $\mu\text{g}/\text{L}$ for drinking water and 0.05 $\mu\text{g}/\text{m}^3$ for air. The health-based criterion for industrial soil is about 4,100 $\mu\text{g}/\text{g}$.

As noted, MOEE recommends standards of 200 $\mu\text{g}/\text{g}$ for residential soil, 10 $\mu\text{g}/\text{dL}$ for drinking water and 0.7 $\mu\text{g}/\text{m}^3$ for air. The proposals for both water and air are above the health-based criteria (the rationale given by the MOEE for these levels is explained in the sections on drinking water and air below). MOEE estimates that individuals exposed to the recommended levels (i.e., maximum allowable in each medium) would, on average, have blood lead levels

of about 5.9 $\mu\text{g/dL}$. This compares with an average of about 5 $\mu\text{g/dL}$ if the individuals were exposed to levels equal to the health-based criteria. MOEE considers that the 5.9 $\mu\text{g/dL}$ is still sufficiently protective of the population.

3.22 Response by the Public

Comments from the public focused on the appropriateness of the consumption rates for each medium, the accuracy of the derived lead intake value for food and the apparent lack of scientific credibility with respect to the derivation of the allocation factors and their application in calculating the health-based criteria. Four commenters indicated that the allocation factors need to be readjusted when the proposed guidelines exceed the health-based criteria to ensure that the IOC_{pop} is not exceeded.

3.23 ACES's Discussion

ACES reviewed some primary sources which were brought to their attention by the public and requested further information from the MOEE on soil ingestion rates, food data, and the allocation factor process.

ACES considers the intake levels for food to be one area where more data are required to provide better confidence in the allocation of exposure to soil, water and air.

By its nature, the selection of the percentage "share" of the IOC_{pop} allocated to each of the media cannot be solely determined by reference to scientific criteria. Deciding how to allocate the IOC amongst media is a risk management exercise which may take into account a wide range of factors including socio-economic considerations. The public did not suggest alternative allocations to the one adopted by MOEE. ACES considers the allocation percentages adopted by MOEE to be reasonable.

ACES addresses the Ministry's recommended deviations from the health-based criteria for water, air and industrial soil in each of the respective sections below.

3.24 ACES's Recommendations

In light of lead's widespread presence and potential negative effects, and given the lack of available data and the uncertainties in the data used, ACES recommends that the assumptions used in the derivation of the health-based criteria be regularly reviewed and updated, possibly every five years, as more information becomes available.

In addition, ACES recommends that discussions be undertaken at the provincial level on public education to reduce exposure to lead from food, targeting parents, schools and daycare centres.

ACES recognizes that the MOEE does not have jurisdiction in the regulation and testing of food products. However, ACES recommends that the MOEE ensure that food survey studies be undertaken to confirm the estimated lead intake from food due to the implications this number has on setting environmental lead standards.

As a result of this multimedia assessment, ACES recommends that the MOEE initiate discussions concerning the regulation of lead in domestic and imported food products with federal government departments, such as Health Canada and Agriculture Canada.

4.0 Public Education

4.1 ACES's Understanding of MOEE's Proposals

The MOEE acknowledges that while the revised environmental standards will play a role in reducing exposure in the long-term, the most effective means of addressing the health risks of lead is through concerted public education programs which target areas of high risk and address all potential routes of exposure. The importance of parental awareness in reducing exposure from soil, water, and air to children through ensuring a well-balanced diet and through personal hygiene, housekeeping practices and flushing of water systems is discussed.

4.2 Response by the Public

Eight commenters supported ongoing efforts to improve public education and many of these outlined the role that provincial and local governments should play in these efforts.

4.3 ACES's Discussion

ACES commends the MOEE on the inclusion of the role of public education in its multimedia assessment for lead. Due to lead's ubiquitous presence in the environment, ACES agrees with the

MOEE and commenters on the need to undertake multi-faceted public education programs.

ACES strongly supports efforts by the MOEE and other government agencies aimed at providing information to the public in order that they can make informed decisions as consumers and undertake actions which will reduce their exposure to lead.

4.4 ACES's Recommendations

ACES endorses all public education efforts by the MOEE and other government agencies aimed at reducing exposure to lead.

ACES recommends that the MOEE support targeted and broad based public education programs (for example, aimed at parents, daycares, schools, hobbyists, paint suppliers and non-professional renovators). One example of such a program is the "Lead Awareness Pilot Project" currently being undertaken by the City of North York. In order to be most effective, public education campaigns must be funded over the long term and ACES recommends that the MOEE consider making funds available for this purpose.

(Other recommendations concerning public education appear in the Medium-Specific Issues section of this report.)

5.0 Government Actions Concerning Consumer Products

5.1 ACES's Understanding of the MOEE's Proposals

The need for the adoption of education, avoidance, safe handling practices and removal strategies for consumer products was identified by the MOEE. Lead-based interior paint is considered to be the largest source of lead exposure for children and is a source of concern for pregnant women in the U.S. In Ontario, houses constructed prior to 1970 may contain paints with high concentrations of lead. Hobbyist solders, metals, paints, pigments and glazes are a source of lead poisoning for children and adults.

Some 1500 tonnes of spent lead shot are discharged into the Canadian environment annually resulting in acute lead poisoning to waterfowl. The MOEE supports the concept of a province-wide ban on toxic shot. Lead sinkers used in fishing are another source of lead poisoning to waterfowl and the MOEE recommends that additional research on sinkers be undertaken to define the extent of the problem in Canada.

In the past, food products have been a significant source of lead exposure. Declines of lead in food have resulted due to the phase-out of leaded gasoline, decreased use of lead solder in the canning industry and decreased lead levels in the water used during food preparation. Ceramic, pewter, crystal and imported food containers continue to be a source of lead contamination in food. Tinned infant formula is an important source of lead, especially if the water used for mixing the formula is high in lead.

5.2 Response by Public

Seven respondents identified the need to educate the public on the risks associated with leaded consumer products. Three respondents indicated that leaded paint was a significant source of lead exposure which had not been satisfactorily dealt with by the MOEE. One respondent indicated that paint should be considered a separate medium to be dealt with in the MOEE's multimedia assessment and that standards should be established for the home renovation industry. One respondent indicated that MOEE should support an amendment to the *Hazardous Products Act* prohibiting use of lead-based exterior paints (currently, the *Hazardous Products Act* prohibits use of lead-based pigments in interior consumer paints for toys and children's furniture and restricts exterior paints to 0.5% total solids) .

One respondent expressed a concern that, if the stained glass industry was not exempt from legislation concerning lead, this small but thriving industry in Ontario would be threatened. One respondent recommended that the MOEE support an amendment to the *Hazardous Materials Act* concerning the use of lead in hobbyist items.

Seven comments encouraged the MOEE to promote a ban on lead fishing sinkers and lead shot since less toxic alternatives are available.

Comments concerning lead from food and housewares centred on the need for public education/publicity, standards for lead content in imported food products, and amendments to the *Hazardous Products Act* concerning the lead content in containers which may be used for food storage and preparation. A number of respondents stressed the importance of educating the public to flush drinking water supplies, particularly when preparing infant formula and in daycare centres and schools. Some respondents suggested that public education strategies could be delivered by local public health units in high risk areas.

One commenter indicated that lead battery recycling should be compulsory. Another submission indicated that warning labels on consumer products containing lead should be mandatory.

5.3 ACES's Discussion

ACES recognizes that the regulation of consumer products containing lead fall outside of the MOEE's jurisdiction. However, ACES considers that the MOEE should publicly and, if possible, financially support actions which are aimed at reducing the lead content of consumer products and public education aimed at avoidance, safe handling, and removal of lead in consumer products.

5.4 ACES's Recommendations

ACES recommends that the MOEE work co-operatively with the federal government towards the virtual elimination of lead in paint.

ACES further recommends that the MOEE initiate discussions with the Ministry of Consumer and Corporate Relations on educational strategies aimed at the purchasers of paint products.

ACES recommends that MOEE undertake discussions with the Ministry of Labour to develop a safe procedure for removal and handling of leaded paint for use by the renovation industry.

ACES recommends the MOEE encourage the federal government to review appropriate legislation and introduce amendments which restrict the lead content in containers for food storage and food preparation.

ACES also recommends that the provincial government, in co-operation with federal government agencies, consider the labelling of leaded consumer products as part of a larger labelling strategy.

ACES recommends that the MOEE support a province-wide ban on the use of lead shot and lead fishing sinkers, since less toxic alternatives exist.

ACES recommends that the MOEE continue to encourage recycling or proper disposal of leaded batteries to reduce their impact on the environment.

6.0 Medium-Specific Issues

6.1 Soil Clean-up Guidelines

6.11 ACES's Understanding of MOEE's Proposals

Residential/Parkland: MOEE recommends that the soil clean-up guideline be lowered from 500 $\mu\text{g/g}$ to 200 $\mu\text{g/g}$ - the derived health-based criterion. A level of 200 is technically feasible based on available remediation techniques.

For home garden soil, a health-based criterion of 124 $\mu\text{g/g}$ was calculated but no guideline was established. The MOEE recommends that further research be conducted on home garden soil, prior to the establishment of a guideline.

Special consideration is given to playgrounds where clean-up should be consistent with rural background levels.

Agriculture: MOEE recommends that the guideline be reduced from the current 500 $\mu\text{g/g}$ to 60 $\mu\text{g/g}$, which is close to rural background levels and is consistent with the MOEE's guidelines for sludge. The health-based criterion was calculated to be 38 $\mu\text{g/g}$. MOEE is supporting research aimed at understanding the effect of soil properties on lead availability to humans.

Industrial/Commercial: MOEE recommends that the number remain at 1000 $\mu\text{g/g}$, despite the fact that the calculated health-based criterion is $>4,100 \mu\text{g/g}$. The proposed lower level will reduce the off-site impact from cross contamination by blowing soil/dust and will help ensure that the quality of industrial sites is within an acceptable range for clean-up to residential soil levels.

The MOEE outlined the costs associated with soil remediation technologies and suggests that in general, the costs are dependent upon the number of sites which require clean-up, the volume to be cleaned and the level to which the soil is being remediated. Due to the significant costs associated with soil clean-up, the MOEE suggests that approaches other than soil replacement and remediation should be considered.

6.12 Response by the Public

In general, a number of issues were raised by the public concerning the application of the soil standards (see 1.0 Application and Enforcement of Standards section of this report). Another set of issues related to the question of whether soil clean-up guidelines are

sufficiently effective to justify the significant costs that are associated with clean-up.

Respondents identified the need for a thorough cost-benefit analysis of the implementation of the proposed standards, particularly given that costly soil replacement and remediation activities may not effectively reduce blood lead levels in children. A number of these respondents indicated that an alternative and a more effective approach would be to direct funds to targeted public education activities in high risk areas. Some submissions indicated that the most cost-effective means of reducing children's exposure to lead should be investigated and implemented. Suggestions included providing information on hygiene, nutrition, dealing with lead based paint, and housekeeping as well as directing funds (which would have been used for soil remediation) at improved schooling and other socio-economic factors which are linked to lead poisoning in children.

Five of the submissions indicated that costs for industrial site clean-up should not be borne by the taxpayer and advocated that a "polluter pay" principle should apply and be strictly enforced.

One commenter questioned whether the cost implications for the revised soil clean-up guidelines was treated equally to that of water since the costs for water remediation would be borne by government agencies, not private industry, as in the case of soil.

Some submissions indicated that by lowering the soil standards, larger volumes of contaminated material would end up being landfilled which may result in increased mobility of lead in the environment due to acidic leachates. Two respondents raised the concern that by lowering the decommissioning standards, costs associated with decommissioning of sites will increase due to limited disposal options for lead contaminated materials.

The need for a central registry for known lead contaminated sites and public access to this registry was identified by two respondents. Registering lead contaminated sites on title was suggested as one approach. Public/community involvement in site clean-up at an early stage was cited by two respondents as being an important aspect of the clean-up process.

Five commenters indicated that natural background variations of lead, the forms of lead in the soil and the soil's chemical (e.g., pH) and physical properties (e.g., texture) should be considered prior to

establishing soil guidelines. Some of the submissions mentioned the need for a clearly defined sampling (including depth to clean-up) and preparation protocols and/or analytical methodology for lead since "extractable" lead levels vary with the method used.

The bioavailability of lead in soils for plant uptake was raised as an area of uncertainty given different soil conditions and the variations between plant species in absorbing lead from soil.

One respondent suggested that an indoor dust guideline be established for public health purposes and that it be based on a loading (i.e., amount of lead/area) rather than concentration.

Residential/Parkland: Concerns were raised about the practicality of maintaining urban playgrounds at lead levels consistent with rural background levels and the lack of a backyard garden soil guideline given the popularity of home gardening. Since these soil guidelines only apply within the context of the Ministry's Decommissioning Guideline (see section 1.0 Application and Enforcement of Standards in this report), many commenters suggested that the standard will be ineffective in reducing lead exposure to children and the costs for clean-up do not justify the benefits. Therefore, other methods of remediation should be considered such as encapsulation and in-situ site management. A tiered approach to soil clean-up which would reduce actual exposure to children was suggested by two members of the public - one higher level to trigger clean-up and a second lower level towards which the clean-up should be directed .

Agriculture: Many respondents who commented on soil issues indicated that the proposed level of 60 $\mu\text{g/g}$ was too low. Concerns were expressed about the impact of this number on viable farmland and the perception of Ontario's produce grown in soils which exceed this value. Three comments questioned whether sludge could continue to be used as a soil conditioner given the stringency of the standard. Due to the historical use of lead containing pesticides, some submissions indicated a concern that orchard soils would greatly exceed the proposed level and the safety of produce from these sites would be questioned. One respondent indicated that the uptake of soil by foraging animals should be considered in addition to the uptake by plant species.

Industrial/Commercial: Some respondents indicated that the industrial lead level should be lowered to be consistent with the lowering of the level for other land use types. Concerns were raised that industry

was given "special treatment" by not lowering the standard and that the MOEE should take advantage of this opportunity to lower the level to avoid problems and costly clean-ups in the future. The issue of cross contamination by industrial/commercial sites to residential/parkland areas was raised by members of the public. Possible solutions which were suggested included implementing measures to control dust, placing restrictions on the distance between industrial soils and residential soils, and posting warning signs clearly delineating lead contaminated properties.

6.13 ACES's Discussion

ACES is of the view that guidelines in isolation from sampling and analytical protocols have the potential for misinterpretation and proposes that the MOEE should reference sampling and analytical protocols for the benefit of those using the guidelines.

ACES shares the concern raised by members of the public that since the soil guidelines are essentially used for decommissioning purposes only, adoption of a more stringent standard will be ineffective in reducing the sensitive population's overall exposure to lead. Accordingly, ACES strongly supports the need for public education about lead avoidance strategies especially those targeted at infants and children and in high risk areas.

While ACES was not presented with detailed information on what the increased costs of decommissioning to the proposed levels are likely to be, ACES does not doubt that the costs can be significant in certain circumstances. ACES also acknowledges that the link between soil clean-up activities and reduced blood lead levels remains uncertain.

However, these considerations do not lead ACES to conclude that the proposed level of 200 $\mu\text{g/g}$ is too stringent. In ACES's view, the modelling and data which underlie the derivation of the proposed soil level are reasonable. ACES is of the view that the study of the relationship between lead clean-up and blood lead levels is at a relatively early stage and, in any case, the studies to date have not convincingly established the lack of connection between clean-up and reduced blood lead.

ACES agrees with the MOEE that special consideration be given to ensuring that the lead levels are limited to the greatest extent possible in covering soil used for commercial or community play areas such as sand boxes, sand lots and baseball diamonds. Soil quality consistent with rural background levels should be used wherever possible.

As for the proposed agricultural guideline, ACES considers that there are convincing arguments for setting it at the residential level of 200 $\mu\text{g/g}$ rather than moving to 60 $\mu\text{g/g}$. While it is probably desirable to develop agricultural soil guidelines for purposes of ensuring the quality of the produce which is consumed in Ontario, the agricultural guideline does not play this role alone, as imported produce contributes significantly to exposure. It is currently relevant only in the context of a change in land use from non-agricultural use (for example from industrial to agricultural), which occurs rarely if at all. In any case, the guideline does not affect the lead content of produce which is grown outside the province but sold in Ontario.

The federal/provincial framework for cooperation needed to set and implement such soil guidelines, and to deal with the issue of the lead content of imported food, needs to be strengthened. Furthermore, the detailed relationships between soil lead levels and lead uptake for different kinds of crops, and the implications for different classes of agricultural land may not be sufficiently identified to establish acceptable levels of lead in agricultural soils.

Moreover, ACES notes the potential for negative socio-economic impacts resulting from the adoption of 60 $\mu\text{g/g}$, including the loss of farmland to residential, commercial or industrial uses due to both reduced land marketability and the increased difficulties of farm financing.

ACES supports the MOEE's proposed Industrial/Commercial guideline of 1000 $\mu\text{g/g}$. While this level is more stringent than the health-based criterion, ACES shares MOEE's concern about potential problems of cross contamination with residential or agricultural soils. ACES was not presented with sufficient health-based data to recommend a further reduction in this level.

6.14 ACES's Recommendations

ACES recommends that sampling, processing and analytical protocols be developed and published for use along with the lead guidelines for soil, water and air.

ACES recommends further study be initiated and/or supported by the MOEE on natural background ranges for lead in soils, speciation of lead in soils and species toxicity, and the bioavailability of lead in soil to food crops.

In view of public comment received, ACES recommends that the MOEE re-examine the merits of setting soil lead guidelines based on soil texture and chemical properties.

Residential/Parkland: ACES recommends that the residential/parkland guideline for decommissioning purposes be established at 200 $\mu\text{g/g}$ - the derived health-based criterion.

ACES supports the MOEE's recommendation that soil quality consistent with rural background levels should be used wherever possible for commercial or community play areas such as sand boxes, sand lots and baseball diamonds.

ACES acknowledges that backyard produce consumption patterns vary widely and recommends that a backyard garden soil guideline be set, for educational purposes, at 124 $\mu\text{g/g}$, the derived health-based criterion, until further studies can be performed on lead uptake by plant species.

Agricultural: ACES recommends that an interim agricultural guideline be set at 200 $\mu\text{g/g}$, the residential health-based criterion, until further data become available on background levels of lead in agricultural soils, lead speciation and toxicity and lead uptake by food crops.

ACES further recommends that the MOEE work closely with provincial agricultural organizations, Health Canada and Agriculture Canada in determining the socio-economic impact of reducing the agricultural soil guideline to 60 $\mu\text{g/g}$ - the MOEE's proposed level.

Industrial/Commercial: ACES supports the MOEE's proposed industrial soil guideline level of 1000 $\mu\text{g/g}$.

ACES recommends that the MOEE's revised Decommissioning Guideline and associated policies consider, i) the establishment of a central registry which can be easily accessed by the public for all lead contaminated sites known to the MOEE and, ii) the placement of signs or distribution of information to the public identifying the location of contaminated sites.

6.2 Ontario Drinking Water Objective

6.21 ACES's Understanding of MOEE's Proposals

The MOEE recommends that the Ontario Drinking Water Objective for lead remain at its current level of 10 µg/L. The derived health-based criterion was calculated to be 5 µg/L.

Three methods for reducing lead in water distribution systems were presented - flushing, replacing lead service lines and corrosion control. The MOEE has expressed concern that costs would be too high for water supply plants to deliver water that will meet the health-based level of 5 µg/L at the consumer's tap.

MOEE has very little data on lead contamination in distribution systems, particularly in Northern Ontario where source waters are very corrosive. Although the Drinking Water Surveillance Program (DWSP) monitors 25% of distribution systems which 75% of distribution systems remain unmonitored.

The MOEE recommends that comprehensive drinking water surveys be undertaken by municipalities, in cooperation with the MOEE, which are representative of each distribution system for lead levels in standing and flushed samples. The MOEE further recommends that public education programs be implemented by municipalities in cooperation with the appropriate public health agencies in areas of high risk, and that corrosion control be implemented in municipalities where results of the survey indicate that greater than 10% of flushed samples are in excess of 10 µg/L. Also, MOEE recommends that individual households consume only flushed water (in keeping with water conservation programs), school boards maintain a consistent and regular flushing and monitoring program in schools, and the ODWO be reviewed as new information becomes available.

Estimated costs for corrosion control in locations identified by the MOEE's DWSP were provided and costs to individual households ranged from between \$5.94 (for larger municipalities) to \$2,394 (for smaller municipalities). No information was provided on costs for lead service line replacement. The MOEE recommends that the potential costs for corrosion control need to be addressed prior to recommending a lower ODWO.

6.22 Response by Public

The majority of respondents that commented specifically on the drinking water standard indicated that the ODWO should be lower, with many citing the health-based criterion of 5 µg/L as their level of choice. One respondent suggested that the current ODWO is not

protective of infants since their primary food intake is water-based. Two respondents indicated that they did not support the use of corrosion inhibitors and that the current ODWO is practical. Two submissions suggested that Ontario examine California's drinking water legislation which restricts the use of lead in plumbing fixtures and provides warning labels on leaded plumbing products.

6.23 ACES's Discussion

In general, ACES supports the approach and recommendations presented in the MOEE's documentation.

The drinking water survey data provided to ACES by the MOEE are not complete but suggest that an ODWO of 5 $\mu\text{g/L}$ may be achievable in most areas sampled by the MOEE's Drinking Water Surveillance Program (DWSP). However, MOEE staff have stated that the impact of reducing the ODWO to 5 $\mu\text{g/L}$ is largely unknown in Northern Ontario communities.

As flushing is an effective, low-cost means of lowering lead levels in water, ACES suggests that an aggressive broad-based public education campaign be launched and targeted educational activities be directed to schools, daycares, and new parents.

ACES considers that the protection of infants is very important, given that their primary food source is liquid and there is a significant potential for lead exposure through the use of lead contaminated water in infant formula.

ACES considers that all households should be aiming for an ODWO of 5 $\mu\text{g/L}$ in flushed samples, since it is the health-based criterion. In order to protect young children from lead exposure, a standard of 5 $\mu\text{g/L}$ should be applied to daycares and schools and there should be some means of ensuring that drinking water flushing and monitoring programs are implemented.

ACES acknowledges that there are some analytical considerations in achieving the 5 $\mu\text{g/L}$ level but this should not impede selectively implementing the standard.

6.24 ACES's Recommendations

ACES recommends that the ODWO remain at 10 $\mu\text{g/L}$, for the time being, and that a goal of moving towards the health-based criterion of 5 $\mu\text{g/L}$ be established.

ACES recommends that studies be completed within 5 years on the technical feasibility and socio-economic impact of lowering the ODWO to the 5 $\mu\text{g/L}$ level, particularly in areas of the province where source water is "aggressive" (i.e., corrosive). At the completion of these studies, ACES recommends that the MOEE re-examine the ODWO with a view to adopting the health-based criterion of 5 $\mu\text{g/L}$.

ACES further recommends that when 10% of the flushed samples exceed the current ODWO of 10 $\mu\text{g/L}$, municipalities investigate the source of the contamination, and remedial actions be undertaken after investigating the full range of available options to reduce lead levels (which may include corrosion control and/or replacement and removal of leaded service lines).

ACES recommends that the MOEE initiate discussions with the Ministry of Consumer and Commercial Relations on the labelling of leaded plumbing fixtures as part of a general labelling strategy.

ACES recommends that the MOEE, in conjunction with local public health departments, establish the goal of achieving 5 $\mu\text{g/L}$ for daycare centres and schools.

ACES supports the MOEE's public education initiatives regarding flushing (consistent with water conservation principles) in high risk areas and recommends that a targeted public education program be launched for daycares, schools, and new parents.

ACES recommends that the MOEE initiate discussions with the Ontario Ministry of Housing concerning amendments to the *Ontario Plumbing Code* limiting the lead content in plumbing fixtures, fittings and mechanical supplies.

6.3 Air Quality Standards

6.31 ACES's Understanding of MOEE's Proposals

The proposed Ambient Air Quality Criterion (AAQC) of $0.7 \mu\text{g}/\text{m}^3$ (30 day arithmetic mean), represents a 77% decrease from the current level of $3 \mu\text{g}/\text{m}^3$. The $0.7 \mu\text{g}/\text{m}^3$, which is 14 times higher than the health-based criterion, was based on an estimated Best Available Technology Economically Achievable (BATEA) for the secondary lead smelter which is currently the emitter of the highest concentrations of lead in the province. The secondary lead smelter industry, the source of the highest lead concentration in the province, is not currently capable of meeting the health-based criterion of $0.05 \mu\text{g}/\text{m}^3$.

In justifying the $0.7 \mu\text{g}/\text{m}^3$ BATEA-based number, MOEE points to two considerations. First, the air pathway is a minor route for lead intake with an allocation factor of $< 1\%$, so that, if exceeded, it does not result in an unacceptable level of overall exposure. Second, at $0.7 \mu\text{g}/\text{m}^3$, the transfer of lead from air to soil results in additional soil accumulations less than $200 \mu\text{g}/\text{g}$ (about $185 \mu\text{g}/\text{g}$) over 50 years.

MOEE notes that there has been a significant decrease in ambient air levels over time.

6.32 Response by Public

In general, there was support for the lowering of air emission standards. Some respondents questioned why the air standard was being made more stringent when it is less than 1% of total exposure. Two respondents suggested that concentration based standards are not very meaningful unless total loadings (i.e., volume) of lead emitted to the air are also known and one submission suggested that a more refined model should be employed in calculating air emission standards.

A submission from the only secondary lead smelter currently operating in the province, which is the smelter upon which the proposed level was derived, disagreed that $0.7 \mu\text{g}/\text{m}^3$ represents a BATEA for their operation. The smelter indicated that the proposed level cannot be consistently achieved and if forced to comply with this standard, operations may be scaled down or closed. The company asserts that this would result in socio-economic consequences such as job loss and environmental degradation due to decreased recycling of lead batteries. Instead of the $0.7 \mu\text{g}/\text{m}^3$ (30 day arithmetic mean) the company proposed two options for ACES's consideration: an AAQC of $1.5 \mu\text{g}/\text{m}^3$ (based on a 90 day average) or, if the $0.7 \mu\text{g}/\text{m}^3$ proposal is recommended by ACES, a

permanent variance for the company permitting them to emit above the proposed level.

6.33 ACES's Discussion

ACES acknowledges that $0.7 \mu\text{g}/\text{m}^3$ represents a 77% decrease from the current level of $3 \mu\text{g}/\text{m}^3$, a notable decline in the allowable levels. However, $0.7 \mu\text{g}/\text{m}^3$ is significantly above the health-based figure of $0.05 \mu\text{g}/\text{m}^3$.

The MOEE provided ACES with 24 hour ambient air quality data. ACES was unable to review 30 day arithmetic mean data. Such data would have permitted a direct comparison with the health-based criterion of $0.05 \mu\text{g}/\text{m}^3$. ACES understands that it is possible that several locations in the province may currently exceed the health-based criterion.

It is ACES's understanding that air standards under regulations 346 and 337 of the *Environmental Protection Act* have normally been set using human or environmental health-based criteria. Accordingly, it appears that the Ministry's proposal to use the BATEA-based $0.7 \mu\text{g}/\text{m}^3$ represents a departure from established practice. While ACES understands that the air monitoring data show that all other emitters in the province are well below this figure, ACES is concerned about a precedent which would use the BATEA for the sector with the province's most concentrated emissions to set the air standard for Ontario as a whole.

ACES is reluctant to support the suggestion made by the secondary lead smelter of individual exemptions from a provincial standard without reference to the principles upon which the exemptions would be made. Such an exemption represents a BATEA based approach and, therefore, a departure from current practice, which is premised on health-based ambient standards. ACES is of the view that this change in regulatory framework could not be recommended in the absence of review and comment by the MOEE and the public.

Given the nature of the concerns expressed in the submission made by the secondary lead smelter, ACES is unable to judge whether the $0.7 \mu\text{g}/\text{m}^3$ represents a BATEA for that smelter. Socio-economic and technical feasibility studies are required to estimate the lowest achievable levels at locations that exceed $0.05 \mu\text{g}/\text{m}^3$. There is also a clear need to review available data on ambient air levels in the context of the health-based criterion.

ACES agrees with MOEE that due to the uncertainty surrounding air to soil transfer, further monitoring and analytical work is required. ACES agrees that the monitoring of point sources of lead should continue and that comprehensive soil monitoring programs should be implemented in the vicinity of industrial point sources where lead has been identified as a concern. The purposes of this monitoring would be: i) to clarify the nature of lead transfers from air to soil, including lead accumulation rates and; ii) to help identify areas of concern where public education activities around lead avoidance strategies are appropriate.

ACES agrees with MOEE that in addition to concentration based emissions data, estimates of total loadings of lead into the environment would be useful but cannot easily be accommodated under the current air regulatory framework. Given concerns about the long term build up of lead, ACES is of the view that this issue merits further evaluation, including the possible modification of the current regulatory framework to accommodate loadings-based standards.

6.34 ACES's Recommendations

ACES recommends that the MOEE adopt an interim Ambient Air Quality Criterion (30 day arithmetic mean) of $0.7 \mu\text{g}/\text{m}^3$ for a **maximum of 3 years** and that a goal of meeting the health-based criterion of $0.05 \mu\text{g}/\text{m}^3$ be established. During the first year, ACES recommends that the MOEE conduct a survey of available data on 30 day arithmetic mean levels of lead in air.

ACES further recommends that studies of the technical and socio-economic feasibility of an AAQC of $0.05 \mu\text{g}/\text{m}^3$ be conducted as soon as possible and within 3 years. At the completion of these studies, ACES recommends that the MOEE re-examine the AAQC with a view to adopting the health-based criterion of $0.05 \mu\text{g}/\text{m}^3$.

ACES recommends that the MOEE develop a compliance plan for those locations that cannot meet the recommended health-based standard of $0.05 \mu\text{g}/\text{m}^3$. The compliance plan should employ the principle of continuous improvement and should be directed at the goal of meeting the AAQC over time.

ACES recommends that MOEE re-examine its assessment of the BATEA value for secondary lead smelters. ACES recommends that research be undertaken into innovative means for controlling fugitive emissions in secondary lead smelters.

ACES agrees with the MOEE that monitoring of point sources of lead should continue and that comprehensive soil monitoring and analysis programs should be implemented in the vicinity of industrial point sources where lead has been identified as a concern.

ACES recommends that the issue of total loadings of lead into the environment be evaluated, including the possible modification of the current regulatory framework to accommodate loadings-based standards. ACES notes that this is consistent with the goal of the virtual elimination of human discharges of persistent toxic substances into the environment.

7.0 Other Issues

While ACES supports the MOEE in its development of multimedia environmental standards, ACES acknowledges that the MOEE considers multimedia exposure to sensitive human receptors and not the natural environment. It is ACES's understanding that the MOEE is working co-operatively with the federal government to examine the role that lead plays in the ecosystem.

The MOEE acknowledges that transfers of lead between media have not been addressed in its assessment. In the case of lead, deposition from air to soil is an important pathway for soil contamination. In more comprehensive multimedia assessments, such transfers may warrant further consideration when deriving allocation factors and applying risk management options.

Summary of Recommendations

Application and Enforcement of Standards

ACES recommends that the MOEE review the lead guidelines within its proposed Decommissioning and Materials Management Policies, Sewage Guidelines and Compost Guidelines with a view to addressing potential inconsistencies.

Risk Assessment

ACES considers that the MOEE's selection of the LOAEL blood lead level of 10 $\mu\text{g}/\text{dL}$ and the Intake of Concern of 1.85 $\mu\text{g}/\text{kg}/\text{day}$ to be reasonable and appropriate in light of the most current research findings and the inherent uncertainties in the data.

In light of lead's widespread presence and potential negative effects and given the lack of available data and the uncertainties in the data

used, ACES recommends that the assumptions used in the derivation of the health-based criteria be regularly reviewed and updated, possibly every five years, as more information becomes available.

In addition, ACES recommends that discussions be undertaken at the provincial level on public education to reduce exposure to lead from food, targeting parents, schools and daycare centres.

ACES recognizes that the MOEE does not have jurisdiction in the regulation and testing of food products. However, ACES recommends that the MOEE ensure that food survey studies be undertaken to confirm the estimated lead intake from food due to the implications this number has on setting of environmental lead standards.

As a result of this multimedia assessment, ACES recommends that the MOEE initiate discussions concerning the regulation of lead in domestic and imported food products with federal government departments, such as Health Canada and Agriculture Canada.

Public Education

ACES endorses all public education efforts by the MOEE and other government agencies aimed at reducing human exposure to lead.

ACES recommends that the MOEE support targeted and broad based public education programs (for example, aimed at parents, daycares, schools, hobbyists, paint suppliers and non-professional renovators). One example of such a program is the "Lead Awareness Pilot Project" currently being undertaken by the City of North York. In order to be most effective, public education campaigns must be funded over the long term and ACES recommends that the MOEE consider making funds available for this purpose.

Government Actions Concerning Consumer Products

ACES recommends that the MOEE work co-operatively with the federal government towards the virtual elimination of lead in paint.

ACES further recommends that the MOEE initiate discussions with the Ministry of Consumer and Corporate Relations on educational strategies aimed at the purchasers of paint products.

ACES recommends that MOEE undertake discussions with the Ministry of Labour to develop a safe procedure for removal and handling of leaded paint for use by the renovation industry.

ACES recommends that the MOEE encourage the federal government to review appropriate legislation and introduce amendments which restrict the lead content in containers for food storage and food preparation.

ACES also recommends that the provincial government, in co-operation with federal government agencies, consider the labelling of leaded consumer products as part of a larger labelling strategy.

ACES recommends that the MOEE support a province-wide ban on the use of lead shot and lead fishing sinkers, since less toxic alternatives exist.

ACES recommends that the MOEE continue to encourage recycling or proper disposal of leaded batteries to reduce their impact on the environment.

Medium-Specific Issues

Soil

ACES recommends that sampling, processing and analytical protocols be developed and published for use along with the lead guidelines for soil, water and air.

ACES recommends further study be initiated and/or supported by the MOEE on natural background ranges for lead in soils, speciation of lead in soils and species toxicity, and the bioavailability of lead in soil to food crops.

In view of public comment received, ACES recommends that the MOEE re-examine the merits of setting soil lead guidelines based on soil texture and chemical properties.

Residential/Parkland: ACES recommends that the residential/parkland guideline for decommissioning purposes be established at 200 $\mu\text{g/g}$ - the derived health-based criterion.

ACES supports the MOEE's recommendation that soil quality consistent with rural background levels should be used wherever possible for commercial and community play areas such as sand boxes, sand lots and baseball diamonds.

ACES acknowledges that backyard produce consumption patterns vary widely and recommends that a backyard garden soil guideline be set, for educational purposes, at 124 $\mu\text{g/g}$, the derived health-based criterion, until further studies can be performed on lead uptake by plant species.

Agricultural: ACES recommends that an interim agricultural guideline be set at 200 $\mu\text{g/g}$, the residential health-based criterion, until further data become available on background levels of lead in agricultural soils, lead speciation and toxicity and lead uptake by food crops.

ACES further recommends that the MOEE work closely with provincial agricultural organizations, Health Canada and Agriculture Canada in determining the socio-economic impact of reducing the agricultural soil guideline to 60 $\mu\text{g/g}$ - the MOEE's proposed level.

Industrial/Commercial: ACES supports the MOEE's proposed industrial soil guideline of 1000 $\mu\text{g/g}$.

ACES recommends that the revised Decommissioning Guideline and associated policies consider, i) the establishment of a central registry which can be easily accessed by the public for all lead contaminated sites known to the MOEE and, ii) the placement of signs or distribution of information to the public identifying locations of contaminated sites.

Water

ACES recommends that the ODWO remain at 10 $\mu\text{g/L}$, for the time being, and that a goal of moving towards the health-based criterion of 5 $\mu\text{g/L}$, be established.

ACES recommends that studies be completed within 5 years, on the technical feasibility and socio-economic impact of lowering the ODWO to 5 $\mu\text{g/L}$ level, particularly in areas of the province where source water is aggressive (i.e., corrosive). At the completion of these studies, ACES recommends that the MOEE re-examine the ODWO with a view to adopting the health-based criterion of 5 $\mu\text{g/L}$.

ACES further recommends that when 10% of the flushed samples exceed the current ODWO of 10 $\mu\text{g/L}$, that municipalities investigate the source of the contamination, and remedial actions be undertaken after investigating the full range of available options to reduce lead levels (which may include corrosion control and/or replacement and removal of leaded service lines).

ACES recommends that the MOEE initiate discussions with the Ministry of Consumer and Commercial Relations on the labelling of leaded plumbing fixtures as part of a general labelling strategy.

ACES recommends that the MOEE, in conjunction with local public health departments, establish a goal of achieving 5 $\mu\text{g/L}$ for daycare centres and schools.

ACES supports the MOEE's public education initiatives regarding flushing (consistent with water conservation principles) in high risk areas and recommends that a targeted public education program be launched for daycares, schools, and new parents.

ACES recommends that the MOEE initiate discussions with the Ontario Ministry of Housing concerning amendments to the *Ontario Plumbing Code* limiting the lead content in plumbing fixtures, fittings and mechanical supplies.

Air

ACES recommends that the MOEE adopt an interim Ambient Air Quality Criterion (30 day arithmetic mean) of 0.7 $\mu\text{g/m}^3$ for a **maximum of 3 years** and that a goal of meeting the health-based criterion of 0.05 $\mu\text{g/m}^3$ be established. During the first year, ACES recommends that the MOEE conduct a survey of available data on 30 day arithmetic mean levels of lead in air.

ACES further recommends that studies of the technical and socio-economic feasibility of an AAQC of 0.05 $\mu\text{g/m}^3$ be conducted as soon as possible and within 3 years. At the completion of these studies, ACES recommends that the MOEE re-examine the AAQC with a view to adopting the health-based criterion of 0.05 $\mu\text{g/m}^3$.

ACES recommends that the MOEE develop a compliance plan for those locations that cannot meet the recommended health-based standard of 0.05 $\mu\text{g/m}^3$. The compliance plan should employ the

principle of continuous improvement and should be directed at the goal of meeting the AAQC over time.

ACES recommends that MOEE re-examine its assessment of the BATEA value for secondary lead smelters. ACES recommends that research be undertaken into innovative means for controlling fugitive emissions in secondary lead smelters.

ACES agrees with the MOEE that monitoring of point sources of lead should continue and that comprehensive soil monitoring and analysis programs should be implemented in the vicinity of industrial point sources where lead has been identified as a concern.

ACES recommends that the issue of total loadings of lead into the environment be evaluated, including the possible modification of the current regulatory framework to accommodate loadings-based standards. ACES notes that this is consistent with the goal of the virtual elimination of human discharges of persistent toxic substances into the environment.

References

Ministry of the Environment and Energy, 1993. Rationale for the Development of Soil, Drinking Water and Air Quality Criteria for Lead. Hazardous Contaminants Branch. Oct. 1993. pp.114.

Ministry of the Environment and Energy, 1994. Scientific Criteria Document for Multimedia Environmental Standards Development-Lead. March, 1994. pp.162.



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LEAD

January, 1994

The Honourable Bud Wildman, Minister of the Environment and Energy, has asked the Advisory Committee on Environmental Standards (ACES) to consult the public and make recommendations on his Ministry's proposed **Soil, Drinking Water and Air Standards for Lead**. This set of proposed standards represents the first in a series of multimedia human exposure documents prepared by MOEE staff.

ACES is an independent advisory body responsible for recommending to the Minister sound, practical standards for environmental contaminants, as well as policies, principles and procedures for setting environmental standards.

We are writing to ask for your comments on the proposed standards. Please refer to the table on the reverse side outlining the current and proposed standards. If you are concerned about the environment and would like to make a difference, we urge you to get involved in this review.

The enclosed advertisement provides important information regarding the consultation program.

We would appreciate it if you would advise others who might have an interest in this issue of this consultation.

The deadline for written comments is **April 11, 1994**.

Disponible en français sur demande.

(Please see over)

Important information enclosed regarding:

- 1) Consultation on the Proposed Interim Drinking Water Objective for Tritium;
- 2) ACES's mailing list.

Comparison of Current and Proposed Standards for Lead

Media	Current	Proposed
Soil - Residential/Parkland - Industrial - Agricultural	500 ppm 1000 ppm 500 ppm	200 ppm 1000 ppm 60 ppm
Drinking Water	10 $\mu\text{g/L}$	10 $\mu\text{g/L}$
Air - 30 day Ambient Air Quality Criterion (Arithmetic Mean) - 0.5 hour Point of Impingement Standard - 24 hour Ambient Air Quality Criterion	3 $\mu\text{g/m}^3$ 10 $\mu\text{g/m}^3$ 5 $\mu\text{g/m}^3$	0.7 $\mu\text{g/m}^3$ 6 $\mu\text{g/m}^3$ 2 $\mu\text{g/m}^3$

ACES

Advisory
Committee
on Environmental
Standards
Contact
Information
on the reverse
side of this document



Setting a standard
for environmental
protection

WE WANT TO HEAR FROM YOU ABOUT LEAD

The Minister of the Environment & Energy has requested that the Advisory Committee on Environmental Standards (ACES) consult the public on the proposed Soil, Drinking Water and Air Standards for Lead. This set of proposed standards represents the first of a series of multimedia human exposure documents prepared by Ministry staff.

ACES was established to contribute to environmental improvement by advising the Minister on standards for environmental contaminants. We are seeking public input before reporting to the Minister and would like to invite you to take part in this public consultation.

ACES is particularly interested in your answers to the following questions, although we welcome any other comments you may have:

1. Is the proposed standard acceptable?
2. If not, what is the basis for finding the proposed level unacceptable?
3. Do you have an alternative level to propose and what is your rationale for suggesting this level?

The deadline for written comments is April 11, 1994. If you are concerned about the environment and would like to make a difference then we urge you to get involved!

For further information, and copies of the documentation, please contact:

Advisory Committee on Environmental Standards
40 St. Clair Ave. West, Suite 401
Toronto, Ontario M4V 1M2

Telephone: (416) 314-9265
Fax: (416) 314-9270



Ontario

Background Document for Lead

Scientific Criteria Document for Multimedia Environmental Standards Development: Lead, prepared by the Ministry of the Environment and Energy.

This report may be reviewed at the following offices:

Advisory Committee on
Environmental Standards
Library
40 St. Clair Ave W
Suite 401
Toronto, Ontario
M4V 1M2

Central Region
Ministry of the Environment & Energy
7 Overlea Blvd., 4th Floor
Toronto, Ontario
M4H 1A8

Barrie District Office
Ministry of the Environment & Energy
12 Fairview Road
Barrie Ontario
L4N 4P3

Southeast Region
Ministry of the Environment & Energy
133 Dalton Avenue, Box 820
Kingston, Ontario
K7K 6C2

Cambridge District Office
Ministry of the Environment & Energy
320 Pinebush Road
P.O. Box 219
Cambridge, Ontario
N1R 5T8

Cornwall District Office
Ministry of the Environment & Energy
205 Amelia Street
Cornwall, Ontario
K6H 3P3

Southwest Region
Ministry of the Environment & Energy
985 Adelaide St. South
London, Ontario
N6E 1V3

Halton-Peel District Office
Ministry of the Environment & Energy
Suite 401 1235 Trafalgar Road
Oakville, Ontario
L6H 3P1

Hamilton District Office
Ministry of the Environment & Energy
9th Floor 119 King Street West
Box 2112
Hamilton, Ontario
L8N 3Z9

West Central Region
Ministry of the Environment & Energy
119 King St. West
P.O. Box 2112, 12th Floor
Hamilton, Ontario
L8N 3Z9

Kenora District Office
Ministry of the Environment & Energy
P.O. Box 5150, 808 Robertson Street
Kenora, Ontario
P9N 1X9

Kingston District Office
Ministry of the Environment & Energy
133 Dalton Avenue
P.O. Box 820
Kingston, Ontario
K7L 4X6

Muskoka Haliburton District Office
Ministry of the Environment & Energy
483 Bethune Drive
Gravenhurst, Ontario
P0C 1G0

North Bay District Office
Ministry of the Environment & Energy
Northgate Plaza 1500 Fisher Street
North Bay, Ontario
P1B 2H3

Ottawa District Office
Ministry of the Environment & Energy
2435 Holly Lane
Ottawa, Ontario
K1V 7P2

Owen Sound District Office
Ministry of the Environment & Energy
1180-20th Street
Owen Sound, Ontario
N4K 6H6

Peterborough District Office
Ministry of the Environment & Energy
139 George Street North
Peterborough, Ontario
K9J 3G6

Northeast Region
Ministry of the Environment & Energy
199 Larch St., 11th Floor
Sudbury, Ontario
P3E 5P9

Sarnia District Office
Ministry of the Environment & Energy
Suite 109 265 Front Street North
Sarnia, Ontario
N7T 7X1

Sault Ste Marie District Office
Ministry of the Environment & Energy
445 Albert Street East
Sault Ste Marie, Ontario
P6A 2J9

Sudbury District Office
Ministry of the Environment & Energy
11th Floor, 199 Larch Street
Sudbury, Ontario
P3E 5P9

Thunder Bay District Office
Ministry of the Environment & Energy
435 James Street South
Suite 331, 3rd Floor
Thunder Bay, Ontario
P7E 6E3

Timmins District Office
Ministry of the Environment & Energy
83 Algonquin Blvd West
Timmins, Ontario
P4N 2R4

Toronto District Office
Ministry of the Environment & Energy
4th Floor 7 Overlea Blvd.
Toronto, Ontario
M4H 1A8

Northwest Region
Ministry of the Environment & Energy
435 James St. South, 3rd Floor
P.O. Box 5000
Thunder Bay, Ontario
P7C 5G6

Welland District Office
Ministry of the Environment & Energy
637 Niagara Street North
Welland, Ontario
L3C 1L9

Windsor District Office
Ministry of the Environment & Energy
6th Floor, 250 Windsor Avenue
Windsor, Ontario
N9A 6V9

York Durham District Office
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4th Floor, 7 Overlea Blvd.,
Toronto, Ontario
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Development of soil, drinking water and air quality criteria for lead

The Ministry of Environment and Energy (MOEE) is recommending revised soil, drinking water and air quality criteria for lead. This recommendation is based on a reassessment of the adverse human health effects of lead. The establishment of revised standards and guidelines for lead is the subject of a public consultation undertaken by the Minister of Environment and Energy's Advisory Committee for Environmental Standards.

USES OF LEAD

Because of its toxicity, lead is currently considered a significant contaminant. Lead is a toxic heavy metal which has been used widely over the years. Lead and its compounds have been used extensively in both interior and exterior paints, dying agents and rust inhibitors. Lead also has been used in a number of products including solder used in cans and plumbing, gasoline and certain pesticides.

Exposure to lead for the general population has decreased significantly over the past decade, largely due to the phase-out of leaded gasoline. Despite the general reduction in exposure to lead, several recent studies on the health effects of lead suggest adverse health effects can occur at levels of exposure previously considered safe.

HEALTH RISKS OF LEAD EXPOSURE

The effects of lead on human health are varied. Exposure to lead can adversely affect many organ systems including the reproductive, cardio-vascular,

blood forming and developing central nervous systems. Young children (aged six months to four years) are considered at greatest risk because they absorb lead more efficiently than adults and, on a body weight basis, they have a greater daily intake. Several studies, which have examined levels of lead in children's blood as an indicator of exposure, have suggested that behavioral effects and learning deficiencies can occur at levels as low as 10 micrograms of lead per 100 millilitres of blood and perhaps lower ($\mu\text{g}/\text{dL}$; a microgram is one-millionth of a gram), levels previously regarded as safe.

Based on these studies, the MOEE and other agencies such as the World Health Organization and the Center for Disease Control in Atlanta recognize a blood lead level of $10 \mu\text{g}/\text{dL}$ as a level of concern. It has been estimated that approximately 18,000 children in Ontario, aged one to four years, may have a blood lead level higher than the level of concern.

THE BASIS FOR THE REVISED CRITERIA

For the purpose of setting environmental standards and guidelines, MOEE has recommended the use of an Intake of Concern for a population (IOC_{pop}) for lead of $1.85 \mu\text{g}$ of lead per kilogram of body weight per day ($\mu\text{g}/\text{kg}/\text{day}$). This value was derived by determining the daily intake that roughly corresponds to a blood lead level of $10 \mu\text{g}/\text{dL}$ ($3.7 \mu\text{g}/\text{kg}/\text{day}$) and applying a safety factor of 2. The use of an IOC_{pop} in deriving environmental standards should offer protection for the majority of young children by preventing undue environmental

exposure to lead.

The approach taken to set standards for lead considers all sources (media) of lead exposure including food, air, drinking water and soil, simultaneously. This is a multimedia approach. Its primary objective is to develop a set of environmental standards which ensure that total lead exposure from all sources does not exceed a level which would present an unacceptable risk to human health.

However, when setting environmental standards, factors other than human health also need to be examined. These include socio-economic considerations such as the availability of technologies needed to achieve such limits and their cost. The recommended environmental standards for lead attempt to strike a balance between the identified risks to human health and socio-economic considerations. The recommended environmental standards for lead are provided in the following table:

RECOMMENDED MULTIMEDIA STANDARDS AND GUIDELINES FOR LEAD

Type of standard/guideline	Current value	Recommended value
Soil - Cleanup guidelines		
residential/parkland	500 ppm*	200 ppm
agricultural	500 ppm	60 ppm
industrial/commercial	1000 ppm	1000 ppm
Ontario drinking water objective	10 ppb**	10 ppb
Air - Ambient air quality criteria (Reg. 337)		
30-day	3 µg/m ³	0.7 µg/m ³
24-hour	5 µg/m ³	2 µg/m ³
Air - Point of impingement standard (Reg. 346)		
half-hour	10 µg/m ³	6 µg/m ³

* ppm - parts per million (µg lead per gram of soil)

** ppb - parts per billion (µg lead per litre of water)

APPLICATION OF RECOMMENDED CRITERIA FOR LEAD

The recommended criteria for lead are applied according to the medium in which it is found.

Soil cleanup guidelines are used within the context of the ministry's decommissioning policy. These guidelines apply when contaminated soil at a site needs to be cleaned up after a plant closes, when land is rezoned (from industrial to residential use for example), or when soil needs to be cleaned up after spills.

Due to the many uses of lead in the past, it is likely that the residential cleanup guideline for lead will be exceeded in many older urban neighborhoods. This does not mean that these areas necessarily pose a risk to human health or that they are now in need of cleanup. The health risk to an individual depends on the degree of exposure. There are many measures residents can take to reduce their risk of exposure such as sodding or paving bare soil, keeping children from eating dirt and from putting things into their mouths.

Ontario drinking water objectives are the primary tool used by the ministry to ensure the acceptability of public water supplies. Achieving drinking water objectives ensures aesthetically pleasing water that does not represent a significant health risk to the consumer.

Most of the lead in drinking water supplies results from the corrosion of lead-containing plumbing supplies.

Obtaining drinking water from pipes which have been flushed of standing water is considered to be the most effective means of reducing exposure to lead in drinking water.

The ministry has two types of air quality standards and guidelines for lead. One covers site-specific emissions and uses half-hour point of impingement standards. The second applies to general indicators of air quality and uses 24-hour and 30-day ambient air quality criteria. Generally, the half-hour

point of impingement standard is set such that the 24-hour and 30-day ambient air quality criteria will not be exceeded.

OTHER SOURCES OF LEAD EXPOSURE

Because of the past uses of lead and its persistence in the environment, Ontario residents will continue to be exposed to lead. For the majority of the population, exposure to lead is not considered a significant health concern. However, some individuals may be placed at greater risk through certain activities and sources of lead. As an example, exposure to lead contained in dust from old lead paints removed during home renovation is a particular hazard for children and pregnant women. In addition, lead can be found in food from cans which use lead-based solder, in certain hobbyist materials, in shot and fishing sinkers.

Children, because of their tendency to put many things in their mouth are at the highest risk of lead exposure. Parental awareness is essential to control this lead exposure among children. Parents should be aware of the potential sources of lead in the home and the ways by which exposure can be lessened.

Parents should teach children the importance of personal hygiene; children's hands should be washed after playing outdoors and before eating. Parents should make sure that children don't eat anything covered with dirt and particularly that they do not eat paint chips.

The document *Rationale for the Development of Soil, Drinking Water and Air Quality Criteria for Lead* identifies the many potential sources of lead in and around the home and provides general guidance on the measures individuals can take to minimize their risk of exposure. In addition, the ministry is participating in the development of education material which is intended to target areas of high risk and address all potential routes of exposure.

FOR MORE INFORMATION:

To obtain the report *Rationale for the Development of Soil, Drinking Water and Air Quality Criteria for Lead* or other information related to the proposed standards and guidelines, please contact:

Advisory Committee on Environmental Standards
40 St. Clair Ave. W.
Toronto, Ontario
M4V 1M2
Tel: (416) 314-9265



Appendix 2: List of Respondents

* denotes submissions received after public consultation response date.

A. Anderson	Director of Public Health Inspection, The Regional Municipality of York, Public Health Department, Newmarket, Ontario
M.E. Anderson	President, The Beaver Valley Heritage Society, Clarksburg, Ontario
H. Baikowitz	President, Technitrol-Eco, Pointe Claire, Québec
J. Beaudoin*	Chair, Battery Council International Environmental Committee, Washington D.C.
M. Bednarz	
N.A. Bell / F.C. Ford	Henderson, Paddon Environmental Inc., Owen Sound, Ontario
I. Betcherman	Ingot Metal Company Limited, Weston, Ontario
B. Bigham	C. Bruce Bigham Consulting, Deep River, Ontario
D.H. Blair	Agriculture Canada, Ottawa, Ontario
J. Bonsteel	
B.A. Brown	Wastestreams Engineering Limited, Toronto, Ontario
W.F.M. Brown	Walter Brown Associates, Environmental Planners and Consultants, Mississauga, Ontario
A.R. Burge	
I. Burkhardt	Senior Policy Analyst, Ministry of Transportation, Environmental Office, Waste & Contaminants Section, Downsview, Ontario
E. Burt	
CUPE*	Canadian Union of Public Employees, Health & Safety Department
E. Carruthers	

R.E. Carter	Quinte Eco Consultants Inc., Belleville, Ontario
J.G. Charlebois	Eco-Mat Recycling Inc., Ottawa, Ontario
D.R. Chettle	McMaster University, Dept. of Physics & Astronomy, Hamilton, Ontario
W.J. Childs	Clerk-Treasurer, Township of Camden, Dresden, Ontario
G. Collier*	Committee Coordinator, The Corporation of the Town of Oakville, Oakville, Ontario
W. Cooney / C. Cooney	
R. Cuyler	
A.G. Darnley	International Geochemical Mapping, Ottawa, Ontario
Wm. Daw*	
E. Earle DePass	
K. Diakun	Environmental Health Promoter, South Riverdale Community Health Centre, Toronto, Ontario
M.J. Diamond	
M. Dickman	Professor & Chair, University of Hong Kong, Dept. of Botany, Hong Kong
R. Doomernik	Technical Director, Fasson Canada Inc., Ajax, Ontario
J. Dorey	Ministry of Transportation, Environmental Office, Waste and Contaminants Section, Downsview, Ontario
G.D. Earle	
F. Eggert / S. Eggert	
H. Emery	President, The Brereton Field Naturalists' Club, Barrie, Ontario

L.J. Evans	Professor, Soil & Water Chemistry Dept. of Land Resource Science, Ontario Agriculture College, Guelph, Ontario
M. Fisher	Town Engineer, Town of Dryden, Dryden, Ontario
R. Frank	Chairperson, Guelph Field Naturalists, Guelph, Ontario
J.C. Fraser	Manager, Windsor Utilities Commission, Windsor, Ontario
R.G. Garrett	Acting Head, Applied Geochemistry Subdivision, Natural Resources Canada, Ottawa, Ontario
R. George*	President, Ontario Federation of Agriculture, Toronto, Ontario
F.T. Gerson	President, F. T. Gerson Limited, Toronto, Ontario
T. Goosen / S. Ruskin	Trustee's Office, Toronto Board of Education, Toronto, Ontario
C. Goulet	
H. Guttman	Chair, Ontario Section, American Water Works Association, Toronto, Ontario
G.T. Harding	Commissioner of Works, City of Windsor, Windsor, Ontario
P.J. Hare	PAC Past Co-Chair
M.V. Harrold*	Site Engineer, Environmental Services Department, Regional Municipality of Ottawa-Carleton, Ottawa, Ontario
P. Hartwig	Deep River Community Liaison Group, Deep River, Ontario
P. Hennessey	
H. Henrikson	President, The Little Cataraqui Environment Association, Kingston, Ontario
J.A. Hewitt/ R.R. Hauge	Anacapa Consulting Services, Ottawa, Ontario
D.J. Hosie	Toronto Board of Education, Toronto, Ontario

S.A. Hulford	
P. Hutton	Chair, Conserver Society of Hamilton and District Inc., Hamilton, Ontario
B.G. Ibbotson	Principal, Angus Environmental Limited, Don Mills, Ontario
B. Jantzi	Blue Sky Research, Oakville, Ontario
L. Jones	
J. Jorritsma	
S. Joseph	Senior Engineer & Chemist, Peto MacCallum Ltd., Toronto, Ontario
A. Juma	
R. Kanipayor	General Manager, A & L Canada Laboratories East, Inc., London, Ontario
D. Kelly / Frank Baldassini*	City of North York, City Clerks Department, North York, Ontario
M.J. Kern	
A. Kimpe	
K. Korneychuk	Supervisor, Waste Management Unit Commercial Branch, Saskatchewan Environment and Resource Management, Regina, Saskatchewan
M. Kramer	Tiny Ratepayers Against Pollution, Perkinsfield, Ontario
J. Kuellmer	
S.A. Lauridsen	Dupont Canada Inc., Maitland, Ontario
C. Laviolette	Director of Public Works, City of Vanier, Vanier, Ontario
A. Lovett	
T.W. Lynd	City Clerk, The Corporation of the City of Windsor, Windsor, Ontario

Wm.H. MacDonald	Superintendent of Public Works, Town of Huntsville, Huntsville, Ontario
P. Maslak	
V. Mason	
D. Matsui	Member, Drug Therapy and Hazardous Substances Committee Canadian Paediatric Society, Ottawa, Ontario
P.W. McCue	Senior Public Health Inspector, City of Scarborough, Scarborough, Ontario.
J. McEwan	N.C.M.W.M., Grimbsy, Ontario
T. Nguyen	Business & Industrial Advisory, Hamilton, Ontario
E. Nichols	Executive Director, Learning Disabilities Association of Ontario, Toronto, Ontario
R.M. Nosal	Commissioner and Medical Officer of Health, The Regional Municipality of Halton, Oakville, Ontario
H.L. O'Neill	
T. Orpwood	
T.R. Pepper	Director of Landfill Operations, Corporation of the County of Essex, Essex, Ontario
A. Piccolo	A & F Equipment Sales, Windsor, Ontario
C. Poirier-Defoy	Vice-President, General Counsel and Corporate Secretary Chair, Environmental Steering Committee, Canada Mortgage and Housing Corporation, Ottawa, Ontario
J.W. Pollock	Director, Public Health Inspection, Etobicoke Health Department, Etobicoke, Ontario
M.D. Preudhomme	Department Head, Esso, Safety, Health and Environment Dept. Sarnia, Ontario
J.W. Rankin	

J. Reffle	Assistant Director, Middlesex-London Health Unit, London, Ontario
M.J. Reid	President, Site Remediation Inc., Etobicoke, Ontario
P. Reid	President, Ontario Mining Association, Toronto, Ontario
A.E. Robinson	
R. Robinson	Ridgetown Public Utilities Commission, Ridgetown, Ontario
R. Rysyk	Etobicoke Gas Appliance Service Inc., Etobicoke, Ontario
C. Sauriol	
T.G. Sawyer	Exec. Vice-President, The Fertilizer Institute of Ontario Inc., Cambridge (Galt), Ontario
M. Shaw	
L. Shephard	
M.I. Sheppard	Head, Ecological Research, AECL, Pinawa, Manitoba
D. Shipway	
J. Silverthorn	
J. Slobodzian	Ministry of Transportation, Environmental Office, Waste and Contaminants Section, Downsview, Ontario
B. Smith	Policy Analyst, Ministry of Transportation, Environmental Office, Waste and Contaminants Section, Downsview, Ontario
D.E. Smith	Director of Engineering Services, Town of Flamborough, Flamborough, Ontario
C. Stanley	
A. Suttle	Executive Director, on behalf of the board and members of Citizens for a Safe Environment, Toronto, Ontario

R. Taylor	1st Vice President, Property Section Chairman, Southern Georgian Bay District Fruit Growers, Clarksburg, Ontario
J.E. Taylor	Director, Public Health Inspection, Elgin St. Thomas Health Unit, St. Thomas, Ontario
P. Toft	Director, Bureau of Chemical Hazards, Health and Welfare Canada, Health Protection Branch, Environmental Health Directorate, Ottawa, Ontario
A. Van Rossum	Environmental Services Engineer, The Corporation of the City of London, London, Ontario
B. Vandenhazel	
N. Vardin	Commissioner, City of Toronto, Department Public Works and the Environment, Toronto, Ontario
W. Wager	Manager, Environment, Safety & Regulatory Affairs, Ethyl Canada Inc., Corunna, Ontario
J. Walker	
B. Wallace	Citizens' Clearinghouse on Waste Management, Cameron, Ontario
G. Ward*	Policy Analyst, Regulation Development Branch, Health & Safety Policy Branch, Ontario Ministry of Labour, Toronto, Ontario
R.W. Waterston	Manager, Quality & Environment, Albright & Wilson Americas, Dunnville, Ontario
M.K. Weaver	Head, Waste and Contaminants Section, Environmental Office, Ministry of Transportation, Downsview, Ontario
M.A. Willis	Facility Manager, The Canadian Salt Company Limited, Windsor, Ontario
D. Wilde	Smith & Wilde Architectural & Interior Stained Glass, Holstein, Ontario
R.S. Wilson	Black Hackle Engineering, Toronto, Ontario
P.R. Youakim	Technologist, Environment Canada, Burlington, Ontario

Appendix 3: Summary Tables of Public Comments

Please Note: ACES has endeavoured to present comment summaries that are a true reflection of the content and context of the responses received. Complete written submissions are available for public review at the ACES office. The names of respondents not representing an organization have been removed in accordance with the *Freedom of Information and Protection of Privacy Act* requirements.

GENERAL COMMENTS

Respondent	Summary of Comments
Art Anderson York Region Newmarket, Ontario	- considers upgrading of standards to be beneficial but technical knowledge on the subject matter limits ability to suggest alternative levels.
H. Baikowitz Technitrol• Eco Pointe Claire, Quebec	- need scientific basis or the best justifiable risk assessment to even consider a standard and requested toxicological and/or epidemiological data
Individual	- questions whether there will be a significant achievable reduction in pollution, whether new standards will mean a difference in the amount in and effect of the pollution discharged, will it be seen as another barrier to business or another hassle in the face of the entrepreneur which may end in very little industrial development and no jobs. - asks committee whether the standards are going to make a difference or are the standards being lowered for appearances only and to bow to the pressure from a few special interest groups.
Individual	- government information should consistently use S.I. units which are clear and accurately reflect the analytical methods used to measure the substance of concern. For lead, the units should be $\mu\text{g/g}$ for soils and $\mu\text{g/L}$ of water.
Individual	- questioned value of public consultation process - concerned that a great deal of work on lead, particularly in the field of epidemiology, has been done and it would be a pity to duplicate it. - questions whether the present concern has a solid grounding in fact given that current exposure levels are "infinitesimal" compared to historical exposures.

GENERAL COMMENTS

Respondent	Summary of Comments
Individual	<ul style="list-style-type: none"> - risk assessment approach is flawed since even low levels of lead present unknown and unacceptable risks. - risk/benefit analysis will not provide the answer when dealing with insidious environmental contaminants. - since childhood lead poisoning is preventable, why hasn't it been prevented? - feels that questions should be asked like: Can we achieve zero discharge of lead into the environment? What are the alternatives for using lead? and How can we get the lead out of our life? - cites examples of "safe" levels of lead in blood in the US from 1960 (60 µg/dL) to 1991 (10 µg/dL) and the fact the National Research Council now believes that the lowest number may not be safe. - early Americans were exposed to 625 times lower lead levels and our current exposure could make us all so brain damaged that we may not be able to frame the right questions.
Eric Carruthers University of Toronto Environmental Coalition and/or Diverse Visions Environmental Research & Services Toronto, Ontario	<ul style="list-style-type: none"> - while it is recognized that these environmental standards represent guidelines for maximum levels, it should be emphasized that the guiding principle for any pollutant's release into the environment is AS LOW AS REASONABLY ACHIEVABLE (ALURA) (sic) and we should always try to minimize the release of any substances into the environment. - money grows on trees, in oceans, in forests and is buried in the earth. Pollution is wasted money.
Individual	<ul style="list-style-type: none"> - no toxic substance ought to be permitted to accumulate in our environment and any person or incorporated entity which releases any toxic material ought to be obligated to remove that material totally. - air must be fit to breathe, water fit to drink and soil must be fit to grow healthy food - there is no suitable alternative. - it is too much to consider some arbitrary number by which we will contrive to accept these toxins.

GENERAL COMMENTS

Respondent	Summary of Comments
Karen Diakun South Riverdale Community Health Centre	<ul style="list-style-type: none"> - pleased that the Ministry is proposing new standards for lead and commends the Ministry for involving the public in the process. - in general, supports the changes to the lead standards. - suggests that children's health be the main criteria for setting standards and that this criteria be balanced with other considerations such as economic cost and the ability of industry to achieve such limits. - recommends: <ol style="list-style-type: none"> 1. re-evaluation of the standards every five years. 2. that soil is tested before a building is demolished and a clean-up plan should be in place, if contaminated. 3. continue to make information on lead and health available to the public. 4. continue to have community participation in the cleanup of contaminated sites. 5. require that the polluter pay for the cleanup. - ask that the Ministry continue to monitor and exercise vigilance around point sources of lead.
Individual	<ul style="list-style-type: none"> - any attempt to reduce toxic elements in the environment is laudable and the proposed levels compare very favourable with those quoted world-wide, being the lowest cited.
René Doomernik Fasson Canada Inc. Ajax, Ont.	<ul style="list-style-type: none"> - no problem with proposed levels.
Gordon Earle Environmental Studies at Large Peterborough, Ontario	<ul style="list-style-type: none"> - voluminous evidentiary material to support a revision to the current guidelines and standards
Individual	<ul style="list-style-type: none"> - many of the expert reports that are cited are old (1987-91) and thinks that findings should be kept current and up-to-date. - "Stations" produce lead and tritium as side products and Whitby is situated both up-and down-wind from them. - research indicates that children living down-wind from a "station" show a "greater percentage of attracting Leukaemia". Others might state that there is no proof of this. - government will have to believe both sides and take a middle viewpoint of both.

GENERAL COMMENTS

Respondent	Summary of Comments
Helen Emery The Brereton Field Naturalists' Club Barrie, Ontario	<ul style="list-style-type: none"> - agree with the proposed reduction of allowable parts per unit and urges the Ontario Government to revise the standards.
L. Evans University of Guelph Guelph, Ontario (Deputation)	<ul style="list-style-type: none"> - questioned whether ACES was aware of Environment Canada's efforts and report to establish guidelines for lead in soils and water.
M. Fisher Public Works Town of Dryden Dryden, Ontario	<ul style="list-style-type: none"> - does not support lowering of levels as the current standards are amply safe. - suggests that these standards are an example of "regulatory over-kill" as the proposed limits represent continuous exposure at the allowable levels in air, water and soil. - feels that the major hazard is specific exposures such as breathing dust while removing old paint, not background contamination. - suggests that this type of over-regulation has unintended results often causing material environmental damage (e.g., fossil fuel consumption, vehicle pollution and disposal risks when digging up huge quantities of soil). - suggests that this "also brings regulators and regulations into disrepute, so that even justified regulation is ignored by a jaded public".
Richard Frank Guelph Field Naturalists Guelph, Ontario	<ul style="list-style-type: none"> - questions the procedure to set standards using the best current knowledge that suggest them to be "safe" for the general public since with the passage of time many so called "safe" standards have subsequently been proven to be harmful (e.g., lead). - Canadians have a right to "clean" (i.e., as close to natural levels as possible) air, water and soil and should be consulted if, when and where this rule is broken. - the local citizen should have a right to decision making on the level of contaminants in what they eat, drink and breathe.
Robert Garrett Geological Survey of Canada Sector Natural Resources Canada Ottawa, Ontario	<ul style="list-style-type: none"> - the cost/benefit of the standards have to be further explored.

GENERAL COMMENTS

Respondent	Summary of Comments
Tam Goossen, Susan Ruskin Trustees' Office Toronto Board of Education Toronto, Ontario	- the proposed changes will reduce the level of lead allowed to be in our air and soils. The Hon. Bud Wildman should be congratulated for his efforts to control lead by strengthening this legislation.
Individual	- pleased with the proposed standards for lead. - standards will benefit the province of Ontario once they are backed by sound policy. Economics and environmental standards cannot work independently from one another unless some decisions have been made to influence the market place to implement them. - if we do not show some directions to policy makers, who will?
G. Harding The Corporation of the City of Windsor Windsor, Ontario	- strongly support the proposed revisions to the environmental standards for lead with one exception which is the reduction in the agricultural land soil cleanup guideline.
Peter Hare Public Advisory Committee for the Metro Toronto and Region Remedial Action Plan Toronto, Ontario (Deputation)	- supportive of the initiative to tighten up the standards for lead.
Pauline Hartwig Deep River Community Liaison Group Deep River, Ontario	- cannot provide comments or recommendations on environmental issues as it is not within their mandate to do so.
Helen Henrikson The Little Cataraqui Environment Association Kingston, Ontario	- approve the criteria proposed. - Rationale is very well done, readable, interesting and understandable by the public addressed and commends the MOEE for an excellent document.
D. Hosie Toronto Board of Education Toronto, Ontario	- concern over the use of the terms "guideline" and "standard". - based on experience in site decommissioning, the Committee should be dismissing values listed as "guidelines" and should be recommending the proposed values as "standards".

GENERAL COMMENTS

Respondent	Summary of Comments
Individual	<ul style="list-style-type: none"> - there is no level of lead in our soil, air or water that is acceptable. - perhaps we have to go backwards a little in order to come forward in a safe environment. - perhaps we advanced too far too fast in bringing people products which we have convinced them they want and need. - three quarters of the goods sold are not essential to our health and well-being, however, we must eat, drink water and breathe air.
Peter Hutton Conservator Society of Hamilton and District Inc. Hamilton, Ontario	<ul style="list-style-type: none"> - applaud the Minister for taking the step to establish new exposure standards and supports any reduction that will reduce the presence of heavy metals in the environment.
Brett Ibbotson Angus Environmental Limited Don Mills, Ontario	<ul style="list-style-type: none"> - questions the usefulness of what the rationale document advocates. If the three criteria recommended in this document were to be achieved, the total intake would be 12% higher than the present and would fail to meet the stated objective of ensuring that intakes does not exceed the IOC_{pop} value. - several aspects of the methodologies, assumptions, and attitudes that underlie this exercise need to be revisited. In its current form, it fails to meet two basic criteria: it is not scientifically defensible, and it will not achieve the stated objectives.
Brian Jantzi Blue Sky Research Oakville, Ontario	<ul style="list-style-type: none"> - proposed standards represent a credible and acceptable second stage of action, i.e., prevention of further deterioration. - does not believe they go far enough to directly address the immediate need for remedial actionin particular, ...exposure of children to lead through ingestion of contaminated soil is the issue of most concern.

GENERAL COMMENTS

Respondent	Summary of Comments
Individual	<ul style="list-style-type: none"> - strongly supports the proposed changes to the air and soil quality standards. - the proposed changes to air and soil standards will help protect the health of Ontario's children. - need a central place to hunt for information about a site, publicly accessible record for known contaminated sites as well as a record of what clean-up has taken place and a record of any contamination left on site. - suggests cleanup committee involving residents, developers and government officials. The public needs to be involved as early as possible in the cleanup process, even before the buildings are demolished. - need for dust control on abandoned or poorly maintained contaminated sites. - must consider health as a major factor in decisions.
Individual	<ul style="list-style-type: none"> - impressed with the clarity of thought that has gone into the presentation of the Criteria and the Rationale documentation - does not dispute the proposed soil, drinking water and air quality criteria but believes that some of the terms being used need to be clarified and some of the recommendations need to be revised before implementation - suggests that lead from long-range transport should be an area of attention in the section on Air Quality Criteria in the Rationale document - identifies a need to clarify of the words "persists" and "persistent" and how they are used in the reports
Kyle Korneychuk Saskatchewan Environment and Public Safety Regina, Saskatchewan	<ul style="list-style-type: none"> - commends the Ministry of Environment and Energy for the manner in which they involve and inform the public when considering changes.
Annette Lovett Fisons Instruments Inc. Ottawa, Ontario	<ul style="list-style-type: none"> - the levels are acceptable.
Thomas Lynd City of Windsor Windsor, Ontario	<ul style="list-style-type: none"> - proposed revisions to environmental standards for lead are supported with the exception of the reduction of the agricultural soil cleanup guideline.

GENERAL COMMENTS

Respondent	Summary of Comments
Individual	<ul style="list-style-type: none"> - surely, after all these years, there must be a master data base with all the materials and information on lead. - developments have been allowed to take place without regard for the quality of life of others. - roadway contaminants have been documented as being relatively immobile but does not believe that by "imobility" we should believe that there is no potential danger. - the committee should not travel and seek input from interested and concerned citizens unless members of this committee remove their blinkers and expand their tunnel vision approach to include all the potential dangers of lead (e.g., gardens, health of residents who are invaded by vehicles from growth areas). - we get lost in definitions such as how much is too much, how much is safe? And "too much" is always subject to interpretation by those people who should protect us. - by unnecessarily technicizing and complicating the process, the law often creates insurmountable barriers to public participation. - wonders about public participation. Is it really effective and for real, or is it merely a tool to coerce the public into believing that we are participating? - public participation obviously goes by the boards as a sacrifice to growth and money. - quotes a excerpt from "An Environmental Health Perspective - State of the Environment Report" which states that "the concern with lead in no longer death by lead poisoning but the effects of smaller dose, insufficient to cause detectable signs and symptoms, but great enough to increase the body burden of lead." - recommends that planning be taken seriously. It is not good enough to give developers the zoning changes which they want to develop the lands without concern or regard for the environment. Municipal planners and the provincial government are solely responsible for our future and our environment. No amount of public input will make a difference if political decisions take precedence over the environmental concerns and thus negate public participation and input. - very discouraging to do all the lead work on my own when so many levels of government are paid by taxpayers and will not or do not wish to help taxpayers or interested

GENERAL COMMENTS

Respondent	Summary of Comments
Doreen Matsui Drug Therapy and Hazardous Substances Committee Canadian Paediatric Society Ottawa, Ontario	<ul style="list-style-type: none"> - found the documents interesting, however, concerned that although the issue of cost was explored for each proposed new standard, an estimate of the total cost of the proposed revisions was not presented. - even a rough estimate of the cost of implementing the revised standards would be useful to compare to the predicted benefits. Will the benefits, which, according to the report, will be limited to a small proportion of the population, justify the costs?
Paul McCue City of Scarborough Scarborough, Ontario	<ul style="list-style-type: none"> - support the standards as they should result in reduced human exposure and thus, reduce the potential for the accumulation of lead in the body.
Individual	<ul style="list-style-type: none"> - Equation D.6 (p. 114) does not make sense philosophically as it should take into account inflation adjustment instead of a reduction fixed discount of 5%
Eva Nichols Learning Disabilities Association of Ontario Toronto, Ontario	<ul style="list-style-type: none"> - in general, agree with the proposed standards. They are a reasonable and welcome improvement over the present limits. - new standards and guidelines must be enforced.
Robert Nosal The Regional Municipality of Halton Oakville, Ontario	<ul style="list-style-type: none"> - support these standards as a progressive step towards reducing human exposure to lead. While the targeted child body burden level of 10 µg/dL is not reached absolutely, the economic/technological factors cited as impediments to this goal seem valid. - interested in knowing if provincial resources to assist in the municipal programs (i.e., comprehensive drinking water surveys, public education) can be anticipated.
Individual	<ul style="list-style-type: none"> - the study does not recognize the effect lead may have on plants or animals. - the cost-benefit analysis hindered the document to recommend a change in the current level of exposure because of the significant costs involved.
Anthony Piccolo A & F Equipment Sales Windsor, Ontario	<ul style="list-style-type: none"> - provided information on equipment for disposal of trash.

GENERAL COMMENTS

Respondent	Summary of Comments
J. Pollock Etobicoke Health Department Etobicoke, Ontario	- does not object to the proposed standards and has no comments to offer at this time.
Individual	- endorses the proposed standards - comments that regulations concerning cadmium should be examined as cadmium as a heat stabilizer in vinyl plastics could be replaced with calcium or calcium/zinc stabilizers.
James Reffle Middelsex-London Health Unit London, Ontario	- there are no substantive requirements for the protection of workers who may be chronically exposed. Perhaps some recommendations for exposure protection should be developed either under Labour legislation or elsewhere, for this purpose. - contingency planning for dealing with some of the various situations likely to be encountered, if and when the environmental lead standards are changed, needs to be carefully considered by the MOEE in liaison with the Public Health Units and the Ministry of Labour.
Patrick Reid Ontario Mining Association Toronto, Ontario (On behalf of Canada Metal Company, Cominco Limited, Lac Minerals Inc., The Mining Association of Canada, Noranda Minerals Inc., and the Williams Operating Corporation.)	- nowhere in the Ministry's documentation is there any mention of the social and economic implications of actually changing the standards as proposed. A cost-benefit analysis should accompany any proposed major policy and/or regulatory initiatives such as this, and in the current climate of fiscal restraint, the costs to society in general must be studied in light of the benefits achieved. - it may be that after a thoroughly balance scientific reviewed cost benefit analysis are conducted, the health and well-being of Ontarians may be better served by a more targeted approach. The broad approach to lead standards may be found to be inappropriate and ineffective in protecting individuals most at risk. Factors such as better nutrition, parental awareness, or improved health and personal hygiene may be more effective.

GENERAL COMMENTS

Respondent	Summary of Comments
Individual	<ul style="list-style-type: none"> - information sheet published by the Ministry in December, 1993 seemed to misrepresent the correlation of lead exposure with neurodevelopmental effects in children and to ascribe more adverse effects to lead in adults than is warranted by available information. Concerns, reinforced by the rationale and scientific criteria documents, are that the scientific information is not current (although the document is dated March, 1994) and conclusions are not entirely consistent with those of international experts. - MOEE process has been spread over an extended period which seems to indicate the project was allocated a low priority and it is unfortunate that moee now seek to rely upon a scientific document which is not current, especially in view of the recent international initiatives. - the cost-benefit analysis should clearly support the need for revision of environmental standards as a substantial, but not necessarily inclusive, contribution to reduction of public health risk. - while lead is a plausible causative factor in a biological sense, it is important to recognize that it is one of several that merit attention in relation to risk management. This raises the issue of whether the other factors contributing to the observed effects on neurodevelopment in the child should also be examined to determine the most cost beneficial intervention. To some extent, lead may be seen as a convenient surrogate measure reflecting socio-economic circumstances. - authority and administrative responsibility for risk management is fragmented between departments and levels of government. Costs associated with management should not be carried by a single agency. It is appropriate to consider the relative magnitude of risk that may, or should, be mitigated through application of environmental standards.

GENERAL COMMENTS

Respondent	Summary of Comments
Individual (Cont'd)	<ul style="list-style-type: none"> - MOEE documents seemingly accept derivative information or policy decisions without critical appraisal, are not well organized, have many internal inconsistencies, incorrect cross references, misuse of words, frank errors and an abundance of "typos". - scientific criteria documents which have been developed by international agencies with expert assistance and a peer review process should provide the starting point for identification and quantification of human health or environmental risks from exposure to contaminants. Costs to Ontario tax payers should be limited to the application of Ontario-specific considerations. - doubts the efficiency of the administrative process adopted by MOEE and whether public comment via an advisory committee is necessarily the most effective or appropriate. This general issue should be examined against Agenda 21 and Rio Declaration on Environment and Development and in the context of cost-effective use of federal and provincial tax dollars.
Tom Sawyer The Fertilizer Institute of Ontario Inc. Cambridge, Ontario	<ul style="list-style-type: none"> - not prepared to support proposed new standards at this time since we do not have adequate information to make an informal decision.
Individual	<ul style="list-style-type: none"> - worked in mining profession as an assayer using PbO in the preparation of charges and was exposed to dust and fumes for over fifty years. - standards tend to be overly strict, with the exception of pregnant women and children. - years after exposure, had blood lead level checked and it was slightly above normal but of no concern to doctors. - feels that he has not suffered from lead exposure (he is now 75) - should not go overboard in setting such low standards that industry and the public can not meet - commends all of those working in the field but at the same time standards should be practical.

GENERAL COMMENTS

Respondent	Summary of Comments
Marsha Sheppard Atomic Energy of Canada Ltd. AECL Research Whiteshell Laboratories Pinawa, Manitoba	- questioned whether the targets are achievable with a reasonable cost-benefit ratio.
Darrell Smith Town of Flamborough Flamborough, Ontario	- supports efforts made to reduce exposure to harmful pollutants and agrees with the way the exposure levels were developed based on multi-media exposure and a maximum level which would represent an unacceptable risk to human health. - questioned how "unacceptable risk to human life" is quantified and what the proposed standards mean in practical terms, such as lifestyle changes.
Aine Suttle Citizens for a Safe Environment Toronto, Ontario	- pleased that MOEE has proposed changes to the current standards based on concern for human health and relieved that the changes are leaning to the side of being safe.
P. Toft, D. Phil Environmental Health Directorate Health and Welfare Canada Ottawa, Ontario	- additional technical concerns and inconsistencies sent to report author - suggests that MOEE staff and HWC staff join forces to complete a joint exposure and risk assessment for lead to improve mutual cooperation on the issue and reduce potential confrontations which might arise. - concerns regarding the assessment and conclusions with respect to lead toxicity, exposure and subsequent guidelines.
Bessel VandenHazel Science Teachers' Association of Ontario St. Thomas, Ont.	- proposed standards meet North American and European standards but lead in isolation from other metals (mercury, cadmium, nickel, arsenic) is rather meaningless due to bioaccumulation and synergistic effects, particularly in the health of children. - IJC has expressed concern about metals and pesticide residues in Great Lakes drinking water supply.

GENERAL COMMENTS

Respondent	Summary of Comments
Wayne Wager Ethyl Canada Inc. Corunna, Ontario	<ul style="list-style-type: none"> - believes that the Rationale and Scientific Criteria Documents are both flawed, and are particularly concerned about the proposed soil guidelines. - in conclusion, the policies and guidelines described, while well meaning, would require huge expenditures resulting in little or not improvement in children's health. There are a number of factors that have a much stronger effect on IQ than that of lead (if any). Resources could be more effectively directed to educational programs on hygiene and safe means of abating lead-based paints. - the costs of compliance to these provisions are great and the benefit may be unmeasurable. If a small percentage of the funds required to comply with these provisions were used to help children with grossly elevated lead levels who are at real risk of health decrements, then this would make a difference. (e.g., removal of children from their environment to an area with no lead-based paint, resulting in a major reduction in blood lead, then benefits would accrue to society.)
Barbara Wallace Citizens' Clearinghouse on Waste Management Cameron, Ontario	<ul style="list-style-type: none"> - supports the recommended levels for lead in soil, drinking water and air.
Robert Waterston Albright and Wilson Dunnville, Ontario	<ul style="list-style-type: none"> - agrees with the new proposed standards and commends the process being used to bring about changes.
M. Willis Canadian Salt Company Ltd. Windsor, Ont.	<ul style="list-style-type: none"> - suggests that a test method for the detection of lead levels be listed with the proposed standards as the measurement of lead can be vulnerable to the analytical procedure used (e.g., airborne lead)
Robert Wilson Black Hackle Engineering Toronto, Ont.	<ul style="list-style-type: none"> - lead levels are realistically achievable. - proposed levels can be readily achieved in most remediated sites without significant financial impact.
Paulos Youakim Environment Canada Burlington, Ont.	<ul style="list-style-type: none"> - proposed standards are acceptable. - suggests two sets of values with two target dates (e.g., 1995, 2002)

APPLICATION & ENFORCEMENT OF STANDARDS

Respondent	Summary of Comments
<p>N. Bell, F. Ford Henderson, Paddon Environmental Inc. Owen Sound, Ontario</p>	<ul style="list-style-type: none"> - involved with screening solid municipal waste and in attempting to classify these recovered fines materials have analyzed for various parameters, including lead. - concerned that a change of the guidelines to a lower value with complicate the acceptance of material as acceptable for uses other than landfill material and it is unclear with the changes in lead standards will affect the "Proposed Excess Soil Guidelines". - current compost guideline is 150 ppm and could be used for agricultural purposes (new proposed standard 60ppm) and the "Inert Fill" guideline from the "Proposed Excess Soil Guidelines" is listed at 45 ppm. Therefore, soil between 45 and 60 ppm is suitable for agricultural lands but not as "inert fill". Should there not be some agreement between the three guidelines. - application of the standard with respect to residential development was questioned. - adoption of the 60 ppm agricultural guideline for lead would mean that development of many orchard lands would require remediation of the soil due to historical use of pesticides and fertilizers. - according to data presented in MOEE's Decommissioning Guidelines, the average Ontario surface soil is too contaminated for Residential/Parkland or Agricultural use. If an orchard site is found to have soils >200 ppm, does this mean that the site will only be suitable for industrial/commercial use? - current existing guidelines of the regulating bodies (primarily MOEE) appear to contain conflicting information regarding the allowable levels of lead in various materials. We would urge that any revisions to the lead guidelines and for that matter, any other guidelines, consider the concentrations in other guidelines. - efforts have been made to reduce the amount of material going to landfill (i.e., Materials Management Policy), on the other hand, reducing soil guidelines will increase the amount of landfill material.

APPLICATION & ENFORCEMENT OF STANDARDS

Respondent	Summary of Comments
D. Hosie Toronto Board of Education Toronto, Ontario	<ul style="list-style-type: none"> - concern with how the values for soil clean-up are interpreted - believes that the 200 ppm (residential/parkland) and 60 ppm (agricultural) will be the values used to determine when a site requires to be decommissioned. - believes that this is not the intent of the proposed values but rather the values required of soil replacements. - recommends that the Committee consider the addition of a second set of values that would determine the levels that would instigate the requirement of site decommissioning.
Individual	<ul style="list-style-type: none"> - recommendation that MOEE continue air monitoring near industrial point sources of lead emissions is inappropriate as the Certificate of Approval for a point source can be amended to require this monitoring. MOEE can maintain control of the method and access to the data by setting specific terms on the conditions of the C of A.
Kyle Korneychuk Saskatchewan Environment and Public Safety Regina, Sask.	<ul style="list-style-type: none"> - industry standard will be used as a pseudo-standard for disposal of contaminated material and will be used by members of industry as the upper limit concentration for the contaminant. - the industrial value will not prevent the inappropriate disposal of low level lead contaminated material. - current level may be appropriate for existing sites, as a form of grandfathering, however lower criteria could be implemented at new sites to reinforce the precautionary principle.
Eva Nichols Learning Disabilities Association of Ontario Toronto, Ontario	<ul style="list-style-type: none"> - need for regulatory requirement to oblige municipalities, School Boards and daycare centres to educate, monitor and take action to prevent higher lead levels in drinking water. - MOEE needs to make 10 ppb a standard so that it has statutory authority to require compliance.
Individual	<ul style="list-style-type: none"> - inconsistency in the three different types of equations for air under the Canadian regulations, which is confusing to start with, but when trying to compare with other countries it is impossible. - a base equation should be available for all research, survey and monitoring. This would enable a uniform air quality standard and guideline for all provinces and countries.

APPLICATION & ENFORCEMENT OF STANDARDS

Respondent	Summary of Comments
<p>James Reffle Middlesex-London Health Unit London, Ontario</p>	<ul style="list-style-type: none"> - while the rationale document states that the revised residential/parkland guidelines are not to be considered values which will trigger cleanup, the perception from the public will be that cleanup should be undertaken to prevent further exposure. Public education will play an important role in these situations. - local Public Health Units have the mandate and personnel to provide assistance in terms of exposure prevention information and environmental risk are identification in their community. - liaison between the MOEE and health units will be needed to refine roles vis-a-vis the MOEE's Decommissioning Policy. - questions who would pay for soil removal, how would citizens get their soil tested (e.g., private labs at owners' expense or MOEE labs at Ministry's expense). - if the rural background level is used for play areas (i.e., 60 ppm), health units will have to assess and likely order closed most such facilities in older urban areas, replacement materials will have to meet the lead standard and care will be needed to ensure that contaminate soils are not relocated to similar high risk areas. - would the presence of sand with lead concentrations of > 60 ppm trigger removal/remediation or would blood lead levels in children using the site be the trigger mechanism.
<p>Individual</p>	<ul style="list-style-type: none"> - introduction of revised environmental standards should be accompanied by a requirement for monitoring to demonstrate to the public the effectiveness of the standards. Requirements that are ineffectual should be discontinued.
<p>Individual</p>	<ul style="list-style-type: none"> - decreased values are to be welcomed but without enforcement these standards will be breached. - MOEE must commit more of the available resources to monitoring and enforcement. If MOEE does not intend to enforce the guidelines then we are wasting our time.

APPLICATION & ENFORCEMENT OF STANDARDS

Respondent	Summary of Comments
Marsha Sheppard Atomic Energy of Canada Ltd. AECL Research Whiteshell Laboratories Pinawa, Manitoba	- questioned targets whether a stepped approach to these levels on a trial basis would be more sensible.

APPLICATION & ENFORCEMENT OF STANDARDS

RISK ASSESSMENT

DERIVATION OF INTAKE OF CONCERN (I.O.C.)

Respondent	Summary of Comments
Individual	<p>report makes no mention of the fact that it is not known if a safe threshold blood concentration for lead exists; the reader is left with the impression that the recommended concentrations of lead are "safe".</p> <ul style="list-style-type: none">- guidelines should reflect the fact that a clear threshold below which there is no risk of adverse health effects has not been identified.- Ontario should follow the EPA's example and clearly state in the guidelines that the goal is to reduce lead concentrations to as low as possible. Of course, practical considerations prevent achieving (or even measuring) a zero level, but all water suppliers should strive to minimize concentrations at the tap.
Bruce Brown Wastestreams Engineering Limited Toronto, Ontario	<ul style="list-style-type: none">- working from a lowest adverse effect blood level for lead is a sound methodology, however, it must be assessed with a realistic consideration to Ontario conditions.
David Chettle McMaster University Department of Physics & Astronomy Hamilton, Ontario	<ul style="list-style-type: none">- provides information about research work in which they measure directly the lead that has accumulated in a person's bones, non-invasively, by <i>in vivo</i> x-ray fluorescence.- bone contains 90-98% of the total body burden of lead in an adult, and the residence time of lead in bone is long, ranging from years to decades which means bone lead reflects long term cumulative exposure in contrast to blood lead measurement which reflects predominantly the previous 5 weeks or so.- lead is eventually released from bone and when it is released becomes a source of an internal exposure to lead, particularly, when the body's calcium metabolism is altered (e.g., menopause, pregnancy, lactation or in the elderly).- method used (e.g., in the U.S.) in assessing the effect of chronic low to moderate lead exposure.

Respondent	Summary of Comments
Individual	- Committee should adopt a standard which takes into consideration the effect on a developing fetus. If one molecule of a substance can destroy, or change forever, one cell, then recommends a "zero" tolerance level be admitted and that a "zero" input standard be put in place.
Karen Diakun South Riverdale Community Health Centre	- supports the proposed Intake of Concern which corresponds to a blood lead level of 10 µg/dL, but maintains that there is no safe level for lead and must keep working for further reduction and aim for a level of no lead in blood.
Individual	- questions method of arriving at the proposed acceptable levels based on the assumption of a direct relationship between blood and tissue/bone levels since heavy metals accumulate in the body. - questions the scientific merit of the document since it is based on blood levels not tissue levels and the association rather than causation of lead with adverse health effects in children.
Gordon Earle Environmental Studies at Large Peterborough, Ontario	- MOEE's proposed standards, guidelines and recommendations are not stringent enough to ensure human health protection nor are they likely to be sufficient in protecting plants and animals. Deleterious human health effects have been observed at levels below 10 µg/dL. - guidelines and standards should be set to ensure blood lead levels no greater than 5 µg/dL. - questions why the MOEE's regulatory response is less rigorous than necessary for the protection of human health and suggests that the answer is not scientific uncertainty but economics and politics. - MOEE's approach is to demand subacute effects be demonstrated before they are believed....and places the onus upon proving an effect as opposed to proving the absence of an effect.
Hershel Guttman Ontario Section, American Water Works Association Toronto, Ontario	- reference material and specifics in the development of the formula relating blood lead levels to route of intake was not included in the document.

DERIVATION OF INTAKE OF CONCERN

Respondent	Summary of Comments
<p>Peter Hare Public Advisory Committee for the Metro Toronto and Region Remedial Action Plan Toronto, Ontario</p>	<p>- and the rationale for setting a safety factor of 2 rather than 10.</p>
<p>Individual</p>	<p>- suggests that the comment (p. 23 of Rationale) "adults have a lower uptake of lead than children" needs better definition as the uptake does not vary, but the exposure does vary with age. Exposure is the issue, not uptake.</p>
<p>Individual</p>	<p>- health based criteria based on blood level measures should be revised to take into account possible accumulations in other biological parts of the body. - X-ray determinations are recommended.</p>
<p>Eva Nichols Learning Disabilities Association of Ontario Toronto, Ontario</p>	<p>- the use of an IOC for lead seems prudent.</p>

DERIVATION OF INTAKE OF CONCERN

Respondent	Summary of Comments
<p>Patrick Reid Ontario Mining Association Toronto, Ontario <i>(On behalf of the Canada Metal Company Limited, Cominco Limited, Lac Minerals Inc., the Mining Association of Canada, Noranda Minerals Inc., and the Williams Operating Corporation)</i></p>	<ul style="list-style-type: none"> - the Scientific Criteria Document alleges health effects at blood lead levels that are not supported by scientific evidence. Furthermore, the Criteria Document takes an unreasonably cautious approach in determining the lowest observed adverse effect level (LOAEL) of lead on children, which directly impacts the calculation of the lead intake of concern (IOC) for the general population....overly conservative decision-making at each stage of the Criteria Document's development has resulted in an unacceptably low IOC, which in turn has resulted in the unnecessarily stringent standards proposed within the Rationale Document. - evidence of consistency (of studies linking lead exposure to deficits in neurobehavioural development) is only compelling if exclusive attention is paid to those studies reporting such effects. When all studies are considered, the lack of consistency among the findings leads to a different conclusion....when taken as a collective whole, the cross-sectional studies available for review do not support a clear association between lead and neurological impairment at blood lead levels below 10µg/dL. This is significant in that 10 µg/dL is the Criteria Document's stated blood level of concern. - the IOC is derived by dividing the LOAEL by a conservative slope factor of 0.21 (derived from dietary intake of infants from birth to 6 months of age). The resulting allowable intake is further divided by a factor of 2. The problem with the use of a slope factor of 0.21 is that it is based on a dietary intake and not soil ingestion. ...the overwhelming majority of recent epidemiological studies designed to determine a blood lead/soil lead relationship have clearly shown that soil lead is a relatively minor contributor to children's blood lead levels. This evidence indicates that a slope factor far less than 0.21 should be used for that percentage of a child's exposure attributed to soil. ...the use of a dietary slope factor in the derivation of IOC_{pop} will lead to an over-estimate of the daily intake from this source (i.e., soil). - the need for an uncertainty factor of 2 is brought into question ... the World Health Organization recently re-evaluated the PTWI for lead in food and confirmed that the uncertainty of 1.4 was sufficient given the high quality of the toxicological data based for lead. Consideration

DERIVATION OF INTAKE OF CONCERN

Respondent	Summary of Comments
Individual	<ul style="list-style-type: none"> - recent information on lead and neurobehavioural deficits in children indicate that there is some evidence of an association below group mean blood lead concentrations of 10-15 $\mu\text{g}/\text{dL}$. The size of the apparent IQ effect (assessed at 4 years and over) is a deficit of between 0 and 5 points for each 10 $\mu\text{g}/\text{dL}$ incremental blood lead concentration (average lifetime integrated value), with the most probable effect in the rate 1 to 3 points (on a scale with a standard deviation of 15). - there is no evidence that children within the age range of 6 months to 4 years are more vulnerable than the foetus, the infant or the child over 4 years of age. Further, the weight of the child increases rapidly within this period and a lead intake expressed on the basis of average body weight (as in MOEE documents is misleading. Thus, 25 μg lead per kg body weight per week is equivalent to 100 μg at one month (4 kg), 200 μg at 6 months (8 kg) and 412.5 μg at four years (16.5 kg). - lead produces a cascade of effects on the haem body pool and affects haem synthesis, some of these effects are not considered adverse. Also, the effects of lead have been demonstrated on a number of enzyme systems but the clinical significance is often uncertain. - in the adult, health effects of lead of particular current concern are the effects on peripheral, sensory, and autonomic nervous systems and a small increase in blood pressure that may be caused by artefact rather than lead. - the overriding concern of lead relates to neurodevelopment in the child. Unfortunately, it is not known whether this originates from an insult to the embryo, from continuous exposure in utero during foetal development or exposures during infancy and childhood. - blood lead measurements will reflect only recent exposures (around 36 days); a large proportion of lead is found in bone (half-life about 27 years) which is not longer considered an inert depository. A number of epidemiological studies of children have included collection of serial blood samples and a new exposure index has been proposed to reflect lifetime exposure. - the proposed standards are not acceptable because the scientific basis for the critical exposure-dose-effect relationship is not current.

DERIVATION OF INTAKE OF CONCERN

Respondent	Summary of Comments
<p>P. Toft, D. Phil Environmental Health Directorate Health and Welfare Canada Ottawa, Ontario</p>	<ul style="list-style-type: none"> - major discrepancy between Health Canada and MOEE on the derivation of tolerable daily intake (TDI). Health Canada uses a TDI of 3.5 µg lead/kg bw/day in recent assessments of the toxicity of lead which is based on Provisional Tolerable Weekly Intake (PTWI) adopted for infants by WHO in 1986. The intake level of 3.5 µg/kg bw/day is considered to be a NOAEL and is based on direct observation of the critical subgroup in the population, infants. - the Ontario document has failed to make full use of available data, thus deriving an intake value which may be unnecessarily low. This discrepancy appears to arise from your failure to account for differential absorption of lead, depending on the route of exposure and age of receptor. - an uptake/absorption of 100% was assumed however, this is evidence in several studies using human subjects that uptake of lead varies according to various factors such as the subject's age and substrate/medium. HWC (1992) used the following absorption factors: 40% for inhaled lead of children and adults; 50% and 10% absorption from ingested water and food for children and adults, respectively; and 30% and 10% absorption from ingested dirt/soil for children and adults, respectively.
<p>Wayne Wager Ethyl Canada Inc. Corunna, Ontario</p>	<ul style="list-style-type: none"> - as acknowledged several times in both documents, there is serious scientific disagreement as to whether lead causes adverse health effects at low levels. Scientists do agree that if there is adverse health effects at these levels, they must be minor. - based on results of the Three Cities Study and South Riverdale project, lowering soil lead levels from the current 500 ppm to 200 ppm would have no measurable effect on blood lead levels. Even if there was a change in blood lead, it could only be detected by using large group statistics, because of uncertainties in laboratory determinations of blood leads (e.g., within plus or minus 6 µg/dL). Because of the large uncertainties associated with IQ measurements, any adverse health effect associated with such a small change in blood lead would also be unmeasurable.

RISK ASSESSMENT

DERIVATION OF HEALTH-BASED CRITERIA

Respondent	Summary of Comments
Individual	<ul style="list-style-type: none">- in reference to Recommendation 1 (p. 48), doubling the health-based criteria increase exposure by more than 11% in the most susceptible population. Babies' primary food intake is liquid. A 7 month old infant weighing 8 kg may consume 800 ml or more water daily. The difference between 5 µg/L and 10 µg/L lead increases the IOC from drinking water from 27% to 54% - the rationale to maintain the current standard is not as clear.
Bruce Brown Wastestreams Engineering Limited Toronto, Ontario	<ul style="list-style-type: none">- the assessment makes the gross assumption that Ontario children will ingest an average of 80 mg of soil/day, taking in 16 µg of lead. Ingestion is believed to be a function of age. Some studies have indicated that typical 2 year olds actually ingest a mean of 195 mg/day and that a conservative estimate for 2 years olds of 250 mg/day should be used for modelling. An Arithmetic relationship to age indicates a steady decline in ingestion to age 13, resulting in a conservative lifetime average US daily exposure of 70 mg/day.- in Southern Ontario, US data may have to be reduced to reflect the period of the year (approx. 100 days) that the soil is covered with snow and outdoor soil ingestion is not possible. In Northern Ontario this may be as high as 135 days. Time of the year studies may be critical in gathering good data in Ontario, although of little importance in a California study.

DERIVATION OF HEALTH-BASED CRITERIA

Respondent	Summary of Comments
<p>Robert Garrett Geological Survey of Canada Sector Natural Resources Canada Ottawa, Ontario</p>	<ul style="list-style-type: none"> - use of average values for establishing standards has its drawback since actual natural distribution of trace elements is defined by a range of values. About one half of the naturally occurring values will fall above the average. - setting a standard at some factor time the average does not take into account the inhomogeneity found in nature. The spread of values differs for different elements and compounds and for different bedrock and soil environments. - scientifically, it would seem to make more sense to set the soil guideline at a multiple of the OTR_{98} value where the multiple could reflect the risk involved in the environment being considered. Where the risks to humans are high, the multiple could be set low. the proposed standard is clearly based on the actual distribution of the element/compound in the environment and the potential risk to humans.
<p>Hershel Guttman Ontario Section, American Water Works Association Toronto, Ontario</p>	<ul style="list-style-type: none"> - when considering the exposure factors for air and food over the time interval noted, there does not appear to be a representative correlation with the stated 50% decline in children's blood lead levels in recent years.
<p>Peter Hare Public Advisory Committee for the Metro Toronto and Region Remedial Action Plan Toronto, Ontario</p>	<ul style="list-style-type: none"> - questions the derivation of the formula used for multimedia allocations, the derivation of the consumption or contact rates

DERIVATION OF HEALTH-BASED CRITERIA

Respondent	Summary of Comments
<p>Brett Ibbotson Angus Environmental Limited Don Mills, Ontario</p>	<ul style="list-style-type: none"> - identifies error on p. 29 (Equation 1) in the formula used to calculate soil guidelines and discusses implications of this apparent error. (<i>Note: Sent to SDB for their response.</i>) - Equation 1 has the appearance of using four parameters to calculate the soil guideline. Further inspection shows that the parameter AF is a function of the other three. ...possibly.. Equation 1 is more a mathematical illusion than a scientific, unbiased approach to setting a soil guidelines. An optimist might conclude that the appropriateness of the mathematics is of secondary importance. It is more important to know that current conditions in Ontario cause intakes that are close to what we could like them to be, but ideally we would like to lower them so that and actual IOC does not exceed IOC_{pop} and a way to achieve that goal is to lower the soil guidelines to be around the average concentration of 200 ug/g. - how would the process of setting AF values change if the actual intake of concern was substantially greater than IOC_{pop}? - what is the rationale for leaving the AF values in Table 2 unchanged from what they are at present? - bioavailability of lead in soil is highly variable (function of chemical form and physical size) and these factors mean that the health risks of ingesting lead in soil are difference from the risks of ingesting lead in water or food. Furthermore, the health risks posed by lead in soil from one location may be considerably different from the lead in soil in another location.

DERIVATION OF HEALTH-BASED CRITERIA

Respondent	Summary of Comments
<p>Ravi Kanipayor A & L Canada Laboratories East, Inc. London, Ontario</p>	<ul style="list-style-type: none"> - not convinced that the level needs to be as low as 60 if the MOEE's recommendation is based on the lead being absorbed into the edible parts of the plant since: studies indicate that the acceptable accumulated value of lead in soil which will neither harm the health of either plants or animals can be as high as 682 mg of Pb/kg of soil (function of the soil CEC); studies have found no correlation between corn grain yield and contaminated metal in soils and no influence of soil lead on corn grain lead levels; studies suggest that the soil-plant barrier prevents the uptake and or transport of lead in the plant thus preventing major accumulation in the food chain; concentrations of lead in plant tissues was not affected by zinc or phosphate fertilizer applications; upper normal concentration of lead in Ontario soils reported by MOEE is 500 ppm for urban and 150 ppm for rural; and a Toronto Department of Public Health report indicates that lead levels in soils up to 500 ppm is safe to grow vegetables for consumption. - these data substantiate the fact that there is no evidence of lead being readily available to plants.
<p>Eva Nichols Learning Disabilities Association of Ontario Toronto, Ontario</p>	<ul style="list-style-type: none"> - Scientists have pointed out that children's air intakes are much higher than adults', and that they drink more liquid than adults, so this must be considered in the future. A value of 0.6 litres consumption and <1% air exposure may underestimate the pattern for children. - exposures from other significant sources, such as leaded paint, is not included in assessment.
<p>Claude Poirier-Defroy Canada Mortgage and Housing Ottawa, Ontario</p>	<ul style="list-style-type: none"> - specifically, the allocation for soil (64%) seems unduly high, indoor dust (the factor that best correlates with children's blood levels) is not referenced as an exposure route, the intake of lead from food sources may be too low (based on a CMHC being undertaken in Saint John) and in selected urban areas, the MOEE water allocation may be a low estimate.

DERIVATION OF HEALTH-BASED CRITERIA

Respondent	Summary of Comments
<p>Patrick Reid Ontario Mining Association Toronto, Ontario (On behalf of the Canada Metal Company Limited, Cominco Limited, Lac Minerals Inc., the Mining Association of Canada, Noranda Minerals Inc. and the Williams Operating Corporation.)</p>	<ul style="list-style-type: none"> - nowhere is the cautionary nature of the Criteria Document more evident than in its selection of a soil ingestion rate. As a result of the methodology employed in the Criteria Document, the soil ingestion rate is arguably the most important influencing variable on the acceptable level of lead in soil. This level (i.e., 80 mg/day) is not only high but appears to have been arbitrarily selected since no supporting documentation is provided. By comparison, several recent, well-designed studies have shown decidedly different ingestion rates may likely apply.
<p>Individual</p>	<ul style="list-style-type: none"> - absorption of lead from environmental sources is not dependent solely on the absolute quantity but also the physical and chemical state in which metal is presented and is influenced by a host factors such as age, physiologic state and nutritional status. The non-linear relationship between blood lead concentration and total lead intake is curvilinear across a broad range blood lead values. - pleased to see comprehensive approach taken by MOEE towards exposure asst as a basis for risk management decisions. However, a significant proportion of human exposure to lead occurs through the diet and it is not entirely clear what this proportion is. The Rational suggests 24%, the Scientific Criteria Document indicates 47% (p.95) for young children, 48% for 0.5-4 years, and suggests 41% for urban and 73% for rural Canadian children (p. 70). Should additional administrative efforts and regulatory measure not be devoted to lead as both a dietary and environmental contaminant? - concerns about the estimate of total daily intake of lead which includes dietary sources and the amount is based on a projection. - recommends adoption of international exposure guidance values, a thorough examination of all options for reducing exposure to lead in Ontario and then recalculation of limits for environmental media based on that fraction of the total exposure which may be cost effectively reduced by imposing and implementing environmental standards. - recommends the WHO guidance value for the recommended maximum total weekly intake (do not use average body weight 6 months to 4 years).

DERIVATION OF HEALTH-BASED CRITERIA

Respondent	Summary of Comments
<p>P. Toft, D. Phil Environmental Health Directorate Health and Welfare Canada Ottawa, Ontario</p>	<ul style="list-style-type: none"> - typical or representative concentrations of lead in the various media appear to have been selected arbitrarily from within a range of observed values. It would be more technically correct and defensible if a less arbitrary method (e.g., weighted means, average value from the most representative study) was employed in the exposure assessment. - with regard to the apportionment of exposure, dietary lead was likely underestimated for all age classes since a significant proportion of the apparent reduction in lead contamination in US foods is due to changes in analytical methods and data analysis, not due to real differences in contaminant levels. An underestimation in the proportion of total exposure from food results in overestimation of the exposure from other media, particularly soil. Results of Canadian Food Composites Study (1986-88) are available and would be the preferred basis for exposure assessment. - estimate the contribution of soil to exposure and ultimately results in the derivation of an inappropriate soil guideline for parkland/residential areas.
<p>Anthony Van Rossum The Corporation of the City of London London, Ont.</p>	<ul style="list-style-type: none"> - believes the criteria allocation should be reconsidered.
<p>Wayne Wager Ethyl Canada Inc. Corunna, Ontario</p>	<ul style="list-style-type: none"> - in cold climates, soil lead cannot affect blood lead because it is covered with snow and the ground is frozen. - Some studies have estimated soil ingestion by children is closer to 4 mg/day, making the impact of soil lead much less important.

PUBLIC EDUCATION

Respondent	Summary of Comments
Individual	<ul style="list-style-type: none"> - water suppliers should be required to educate their customers on how to reduce their exposure to lead in drinking water. Water consumers should be made aware that the guideline is for flushed, cold water samples and that a water supplier could be within the guideline even when standing samples contain higher concentrations of lead. People need to know strategies for controlling their exposure to lead.
Eric Carruthers University of Toronto Environmental Coalition and/or Diverse Visions Environmental Research & Services Toronto, Ontario	<ul style="list-style-type: none"> - while the role of the parent in child education is vital, the role of our education system and of television seems to have been overlooked in the section on "Other Sources of Lead Exposure". Teachers should be educating the children on such hazards and educational commercials or cartoons on Saturday morning would probably reach the largest number of children in the shortest time. - stronger education is required so that the public knows that they should let a tap run for a specified period of time.
René Doomernik Fasson Canada Inc. Ajax, Ont.	<ul style="list-style-type: none"> - questioned whether ACES is looking into heavy metals, such as lead, in packaging and labelling products similar to those in the U.S. where reduction criteria set for four heavy metals over the next few years.
Hershel Guttman Ontario Section, American Water Works Association Toronto, Ontario	<ul style="list-style-type: none"> - implementation of an education program in high risk areas may be better administered by the local health authorities.
Helen Henrikson The Little Cataraqui Environment Association Kingston, Ontario	<ul style="list-style-type: none"> - Table 1 pointing out the health effects should be published in the media, maybe emphasizing the fact that no threshold for blood lead levels has been established for learning/behavioral deficits in children. - the us PbAs pesticides in orchards should be publicized. What is the content of metals in the fruit? Is there a less toxic chemical alternative? - LCEA believes public education is extremely important and necessary. Government departments, must play a leadership role in ensuring this information reaches the public in the media and this should be a continuous process. What are the parents responsibilities for reducing lead intake of their children and how to do it?

PUBLIC EDUCATION

Respondent	Summary of Comments
Individual	- feels a public education program is needed to go with the standards.
Individual	- recommends more educational meetings and information handouts to each municipality and household to inform them of the "real" effects of lead exposure. A one page memo should be sent to each household educating them on the real effects of lead, particularly during spring cleaning months and during renovations. This educational program should be sponsored for a few years so that it becomes ingrained in peoples' minds.
James Reffle Middelsex-London Health Unit London, Ontario	- how does the Ministry plan to promote the need for changes in the standards to the public, beyond the ACES review? Local Public Health Units should be consulted when it comes to planning or refining a communications plan for the local community.

GOVERNMENT ACTIONS CONCERNING CONSUMER PRODUCTS

Respondent	Summary of Comments
Individual	<ul style="list-style-type: none"> - MOEE should encourage and promote a lead shot ban for Ontario.
Gordon Earle Environmental Studies at Large Peterborough, Ontario	<ul style="list-style-type: none"> - MOEE should speak out more strongly against those areas not directly under its control and to provide recommendations help individuals minimize their exposure to lead (e.g., paint, food and other consumer products) - MOEE is shirking some of its responsibility by trying to show that the sources of lead exposure it regulates is less relevant to human health than those sources regulated by other agencies. - MOEE should endorse an amendment to the <u>Hazardous Products Act</u> which would prohibit the use of lead-based pigments in exterior consumer paints, lower the legal maximum of lead for consumer products such as crystal decanters and ceramic or pewter items which are used for food or beverages. - supports ban of lead fishing sinkers and lead shot based on lethal and sublethal effects on aquatic species. Alternative shot (i.e., steel) is available without detriment to hunter success rates or gun barrels. The additional cost of steel shot does not negate the environmental benefit. - Similarly, MOEE should endorse a ban on the use of lead sinkers.
Peter Hare Public Advisory Committee for the Metro Toronto and Region Remedial Action Plan Toronto, Ontario	<ul style="list-style-type: none"> - will recommend to the PAC to support a ban on lead shot and sinkers.
Helen Henrikson The Little Cataraqui Environment Association Kingston, Ontario	<ul style="list-style-type: none"> - substances in glazes that might leach out, including lead. What monitoring or advice does the government provide and how long should food be cooked and stored? Can't the MOEE recommend stamping the pottery for dangerous chemicals? Is Canadian pottery by hobbyists safe? How can the public unless the government informs us?

GOVERNMENT ACTIONS CONCERNING CONSUMER PRODUCTS

Respondent	Summary of Comments
<p>J. Hewitt, R. Hauge Anacapa Consulting Services Ottawa, Ontario</p>	<ul style="list-style-type: none"> - recognises that paint does not fall within the regulatory framework of the Ontario Government, failure to recognize its importance in overall lead blood levels and risk management policies weakens the value of the multi-media exposure profile. A child's body does not recognize jurisdictional boundaries when ingesting lead. - if the Ministry considered it advisable to make recommendations vis-à-vis in-place management of risks from lead paint, it is somewhat perplexing that Table 2 (p. 26 of Rationale) does not include paint as one of the media. - the recommendations concerning paint are largely "management" in nature and do not include specific levels to which paint on existing houses should comply. Failure to establish such standards means that the home renovation industry has little guidance and not protocol for self-protection or protection of ultimate occupants.
<p>Brian Jantzi Blue Sky Research Oakville, Ontario</p>	<ul style="list-style-type: none"> - eliminate frivolous and non-essential uses of lead (e.g., lead hot, sinkers etc.) especially where ready, non-toxic substitutes exist. - it may be more effective to establish criteria for lead content (and its determination) in fresh and canned domestic and imported foods to assure the safety of food consumed while precluding international trade dispute on the issue. Such a performance measure would also avoid the need to make intermediate assumptions about how much lead in soil is metabolized from soil into different food materials. - eliminate frivolous and non-essential uses of lead (e.g., lead shot, sinkers etc.) especially where ready, non-toxic substitutes exist.
<p>Sidney Joseph Peto MacCallum Ltd. Toronto, Ontario</p>	<ul style="list-style-type: none"> - In the standards, no mention is made of provincial values for lead-based paints.

GOVERNMENT ACTIONS CONCERNING CONSUMER PRODUCTS

Respondent	Summary of Comments
Individual	<ul style="list-style-type: none"> - lead shot in shotgun cartridges could easily be replaced by steel shot or plain iron shot, fishing leads could be replaced by steel, alternatives for lead acid batteries exist but are not yet practical. - suggests compulsory recycling of all lead batteries. - questions how the government will be able to override selfish lobby groups (e.g., shotgun cartridge manufacturers) and suggests that binding public referendums or Ministry of the Environment polls be used to pass necessary legislation. - prior to the poll or referendum, samples of hair from school children should be collected and analyzed and the results publicized so that the public is aware of the dangers of lead poisoning.
Individual	<ul style="list-style-type: none"> - concerned about lead shot and lead fishing weights - these two items are entirely unnecessary and suggests that they be banned - may not be major sources of lead into the environment but they could so easily be stopped without any real inconvenience to the users.
Wayne Wager Ethyl Canada Inc. Corunna, Ontario	<ul style="list-style-type: none"> - the issue of lead-based paint was virtually ignored in the documents. Lead from exterior lead-based paint would recontaminate soils with ≤ 200 ppm lead to levels approaching pre-abatement levels through weathering and chalking, even if cracking and peeling are absent. Interior lead-based paint would continue to contribute significantly to house dust, even if the paint were intact. Therefore, even if billions of dollars were spent in complying with these guidelines, the major source of exposure - paint - would continue unaffected.
Barbara Wallace Citizens' Clearinghouse on Waste Management Cameron, Ontario	<ul style="list-style-type: none"> - recommends a province-wide ban on the use of lead shot and lead-based fishing sinkers.

GOVERNMENT ACTIONS CONCERNING CONSUMER PRODUCTS

Respondent	Summary of Comments
<p>David Wilde Smith & Wilde Architectural and Interior Stained Glass R.R.#2 Holstein, Ont.</p>	<ul style="list-style-type: none"> - hopes that the Canadian stained glass industry will be exempt from legislation concerning the use of lead. - supports the approach taken in the US which has strict guidelines for handling and disposal of lead in the stained glass industry. - most concerned about his health, the health of his family and users of the products he manufactures and those involved in producing and handling the raw materials which he uses. - not sure whether these standards will affect those industries that supply lead came (channel) in Ontario. Since there is no substitute for lead in stained glass, this might threaten the small but thriving stained glass industry in Ontario. - the charts and figures did not explain if the proposed levels are in fact achievable to ensure the survival of current lead suppliers. No alternatives were offered. Nowhere was the stained glass industry mentioned specifically. - stained glass windows are not dangerous, they pose no threat to the health of the viewer. - the stained glass industry in the US was recently threatened by the total removal of lead's availability and use and only through extensive countermeasures was the industry able to survive by having stained glass use exempted from a ban on lead. - consultation programme is far from being conclusive if information submitted in defence of the stained glass industry's use of lead in the US and its subsequent exemption from a total ban, is not reviewed by ACES. - requests the cooperation of the Committee to attempt to supply the information to avert a crisis within the Ontario stained glass community who might not be able to survive a challenge similar to that in the US. - if this information is not included in the report to the Minister of Environment and Energy, then at least mention should be made of it so that the Ministry can do further research. - please include this appeal on my behalf, and if no other submissions have been made on behalf of the stained glass industry, then consider this also an organization appeal on behalf of "Artists in Stained Glass" which represents the medium of stained glass across Canada.

SOIL COMMENTS

Respondent	Summary of Comments
<p>Bruce Bigham C. Bruce Bigham Consulting Deep River, Ontario</p>	<ul style="list-style-type: none"> - suggests that the residential soil value should remain at 500 ppm.
<p>Darlene Blair Food Production and Inspection Branch Agriculture Canada Nepean, Ontario</p>	<ul style="list-style-type: none"> - review of literature concerning heavy metals in soil-plant systems indicates that the behaviour of lead in a given system is difficult to predict. - there is a direct relationship between the concentration of lead in the growing medium and the amount of lead that is taken up by plants which lends support to the concept of limiting exposure to lead by limiting lead levels in soils on which food is produced. - current assessment indicates that crop producers have access to agricultural fertilizers and supplements with sufficiently low lead levels to allow the proposed agricultural guideline to be met - if the availability of suitable products becomes limited and soil fertility or physical properties are threatened, the "no net accumulation" approach to lead levels in agricultural soils may need to be reassessed. - while the implementation of stricter standards may impede efforts to reduce the flow of wastes to landfill, the new uses for these products must not jeopardize the safety of food or environment, now or over the long term. - questions units of expression for lead concentration (e.g., total? on a dry soil weight basis?)
<p>Walter Brown Walter Brown Associates Mississauga, Ontario</p>	<ul style="list-style-type: none"> - suggests that the proposed value of 60 ppm of lead for agricultural soils is too low; a more realistic figure would be 200 ppm. - concerned that setting a low figure might exclude some sludge, which is a valuable resource as soil conditioner, from being spread on farm land.

Respondent	Summary of Comments
<p>Iris Burkhardt Ministry of Transportation Downsview, Ontario</p>	<ul style="list-style-type: none"> - proposed lead levels may limit disposal options could result in increased costs when decommissioning residential and agricultural properties (especially if the revised levels are reflected in the Proposed Materials Management Policy and Decommission Policy). - the potential for registration on title could increase, if the proposed lead levels are reflected in Decommissioning Guidelines. - the proposed levels could have an impact on MTO management of options with respect to highway property immediately adjacent to a highway. - additional research on the potential migration and impact of contaminants from an operating highway, is necessary to fully assess the impact of the proposed change. - potential for negatively impacting the market values of residential/agricultural properties which could affect the Ministry when acquiring and disposing of properties in the vicinity of a highway.
<p>Eric Carruthers University of Toronto Environmental Coalition and/or Diverse Visions Environmental Research & Services Toronto, Ontario</p>	<ul style="list-style-type: none"> - reduction of residential/parkland and agricultural standards seems quite reasonable. - maintenance of industrial levels at 1000 ppm is a continuation of industrial pollution subsidies which cannot continue to be sustained by our environment or economic system. Society will eventually have to cleanup after these industries.
<p>Ronald Carter Quinte Eco Consultants Inc. Belleville, Ont.</p>	<ul style="list-style-type: none"> - proposed reduction in lead guideline in agricultural soil from 500 ppm to 60 ppm is excessive. He has tested areas up to 500 ppm that are producing excellent crops and with no known adverse side effects. - proposes that the agricultural level be reduced to 200 ppm, consistent with the proposed parkland designation. - reducing the level from 500 to 60 ppm would cause undue hardship to many property owners with no health benefit.
<p>J. Charlebois Eco-mat Recycling Inc. Ottawa, Ont.</p>	<ul style="list-style-type: none"> - proposed standards for lead in soils is quite acceptable and more reasonable than earlier guidelines for the Management of Excess Soil. - experience with the remediation of petroleum contaminated soils by low temperature thermal desorption in New Brunswick. These remediated soils could be reused in a wide variety of applications and fall within the new proposed Ontario soil standards for lead.

SOIL COMMENTS

Respondent	Summary of Comments
<p>WendyJo Childs Township of Camden Dresden, Ontario</p>	<ul style="list-style-type: none"> - Camden Council feels that upon reviewing the current value and the recommended values that the residential measurements and agricultural measurements should be the same. Council feel that due to the fact that the agricultural areas supply produce to the urban areas for consumption, that the same levels of lead would be in existence. Therefore, the composting of such vegetable matter would add to the lead levels to be found in the soil in the urban areas. Council also noted that lawns and parks in urban areas would be fertilized at a higher rate than an agricultural use.
<p>A. Darnley International Geochemical Mapping Geological Survey of Canada Ottawa, Ont.</p>	<ul style="list-style-type: none"> - abundances of naturally occurring elements may vary by 2 to 3 orders of magnitude in surface materials due to natural causes. Natural variations must be established by systematic mapping to avoid serious risk of administratively prescribing limits for "contaminants" which may be unrealistic, cause unnecessary alarm, litigation and economically damaging consequences. - need to secure more comprehensive provincial, national and international data before defining standards for "contaminants".
<p>Karen Diakun South Riverdale Community Health Centre Toronto, Ontario</p>	<ul style="list-style-type: none"> - support a guideline of 1000 ppm (industrial/commercial) and support lowering the agricultural guideline to 60 ppm. - lowering the guidelines for lead in residential soil from 500 ppm to 200 ppm is a positive step - questions why a much higher level is acceptable for backyard gardens and encourages the Ministry to have zero lead in soil as the ultimate goal.
<p>Mike Dickman University of Hong Kong Department of Botany Hong, Kong</p>	<ul style="list-style-type: none"> - recommends that the lead in industrial soils should be lowered from 1,000 ppm to 800 ppm - if that cannot be done then the public has the right to know why not.

SOIL COMMENTS

Respondent	Summary of Comments
<p>Gordon Earle Environmental Studies at Large Peterborough, Ontario</p>	<ul style="list-style-type: none"> - many locations will pose no less of a health threat now than they did in the past, unless of course they are rezoned, decommissioned or mothballed or a spill occurs. - the MOEE's cost-benefit analysis is biased because the cost of regulation are more quantifiable than the benefits. - recommends that a separate category be established which sets the levels of lead permissible in covering soil used for community or commercial play areas at a maximum value of 15 ppm (the mean value for agricultural soils) <p>Residential/Parkland</p> <ul style="list-style-type: none"> - MOEE's proposed guideline for residential soils ignores home-grown vegetable consumption which is not prudent on the part of MOEE in light of the popularity of backyard and community gardening. - supports a revised standard of 125 ppm for residential soils since it is believed that lead concentrations in urban residential soils above this value are the result of historical use of lead-based paint and atmospheric deposition prior to the phase-out of leaded gasoline. Lead concentrations greater than 125 ppm should not occur beyond a soil depth of 1 cm and if lead occurs at higher concentrations at depth, it should be subject to clean-up by the party responsible. The revised standard of 125 ppm is technically feasible using certain soil remediation techniques. <p>Agricultural</p> <ul style="list-style-type: none"> - supports an agricultural soil guideline of approximately 34 ppm which is derived from the same equation as the residential/parkland soils and incorporating a value of 100% for vegetable consumption. Failing the feasibility of achieving this value, supports a value which does not exceed the upper limit of the background range (i.e., 50 ppm). - the MOEE's proposed guideline of 60 ppm is in accordance with the sludge guidelines and is based on the degree of plant uptake from soil and is adequate to protect food crops from lead contamination. However, ingestion of soil along with forage can be a large source of lead for cattle and other grazing animals. Therefore, agricultural soil guideline should show regard for both the uptake of lead from soil by plants and the lead concentration in the soil itself. <p>Commercial/Industrial</p>

SOIL COMMENTS

Respondent	Summary of Comments
<p>L. Evans University of Guelph Guelph, Ontario</p>	<ul style="list-style-type: none"> - suggests that consideration be given to background concentrations of lead in soils, the forms of lead in soil and the mobility and potential toxic effects of lead species in soil solution, prior to formulating lead guidelines for soil and water. - suggests that pH should be considered in these guidelines since the mobility of lead in soils is highly pH-dependent. Another soil property to consider would be texture. - in Parkland/Residential and Agricultural soils, pH and texture must be considered if the growing of vegetables and crops is a concern for lead entering the human food chain. - in Industrial/Commercial soils, consideration should be given to the potential pathway for lead to enter the mammalian food chain through birds and small mammals feeding on lead-contaminated earthworms from soil up to 1000 ppm. - suggests that some controls should be placed on the distance of Industrial/Commercial soils from residential areas due to the possibility of blowing dust and on restrictions on the storage and disposal of certain industrial wastes at these sites so as not to remobilise any lead.
<p>Richard Frank Guelph Field Naturalists Guelph, Ontario</p>	<ul style="list-style-type: none"> - since true clean-up of a soil or sediment is difficult and costly and is only accomplished by removal and dumping in some other less sensitive site, it would make more sense to extract the lead at levels above 1000 ppm. - suggests that following clean-up of sites, it be vegetated with native plant species to prevent the soil surface from being eroded by wind or water and transported and deposited on "clean" sites or into rivers. - suggests a need for two sets of standards; one for the clean-up of currently contaminated sites, such as those being proposed and another set for new and "clean" sites being developed commercially that would be only marginally higher than background levels. - costly clean-up of sites should be charged back to the producers of the commodity and prevention of contamination is much less costly to society and can be charged to the current business and commodities produced.

SOIL COMMENTS

Respondent	Summary of Comments
<p>Robert Garrett Geological Survey of Canada Sector Natural Resources Canada Ottawa, Ontario</p>	<ul style="list-style-type: none"> - the proposed standard for agricultural soils was set as a multiple of an assumed average background without knowing what percentage of lead was bioavailable; the residential/parkland guideline was based on assuming that 100% of the lead is bioavailable. - questions the utility and validity of ecotoxicological approach. - justification for the procedures used to arrive at the 60 ppm level must be explained. - future studies should be undertaken to determine what fraction of the measured lead is in fact bioavailable. If 10% is a reasonable estimate then ecotoxicological standards for residential parkland would be 1900 ppm "total" and 340 ppm "total" for agricultural soils. Perhaps lead levels should be set higher to reflect bioavailability and high background levels from historical uses of lead. - levels could be based on risk related multiples of the appropriate OTR₉₈ value with "old" and "new" site values (e.g., 500 ppm in "old" communities and 200 ppm in "new" communities) - in light of ambiguities in standard setting procedures and lack of a full consideration of bioavailability, believes that the province should proceed forward with greatest care, essential that new standards be clearly stated and unambiguously and consistently derived and defined. - a number of specific comments/suggestions on the document provided.

SOIL COMMENTS

Respondent	Summary of Comments
<p>Robert Garrett Geological Survey of Canada Sector Natural Resources Canada Ottawa, Ontario</p>	<ul style="list-style-type: none"> - acknowledges difference between naturally occurring lead present in rock, glacial materials and soils and anthropogenic processes. Life clearly co-exists with lead at moderate levels and its toxicity at high levels is unquestioned. High levels can exist because of anthropogenic and natural processes. - estimates for average lead content are based on partial extractions by nitric acid leaches and neither measure "total" or "available" lead in soils. Agriculture Canada determinations of average lead yield estimates 100% higher than those used by the Ministry. It is essential that the analytical procedure used to measure lead, as well as size fraction of soils analyzed whether the fraction was ground, and the parent material the soils developed on be stated. - lack of specificity as to the sampling, preparation and analytical procedures it potentially a major source of confusion amount of the proposed standards. - use of average values for establishing standards has its drawback since actual natural distribution of trace elements is defined by a range of values. About one half of the naturally occurring values will fall above the average. - setting a standard at some factor time the average does not take into account the inhomogeneity found in nature. The spread of values differs for different elements and compounds and for different bedrock and soil environments. - stress the importance of geological provenance in controlling the chemistry of soil parent material. - scientifically, it would seem to make more sense to set the soil guideline at a multiple of the OTR_{95} value where the multiple could reflect the risk involved in the environment being considered. Where the risks to humans are high, the multiple could be set low. the proposed standard is clearly based on the actual distribution of the element/compound in the environment and the potential risk to humans. - standard definition section as an Appendix would be useful to ensure consistency in terminology (e.g. residential/parkland) - believe that the 60 ppm standard for agricultural soil may be too low and may be exceeded by natural occurrences.

SOIL COMMENTS

Respondent	Summary of Comments
<p>G. Harding The Corporation of the City of Windsor Windsor, Ontario</p>	<ul style="list-style-type: none"> - 60 ppm is a reasonable guideline for restricting the application of sewage sludge with high lead content to agricultural soils with existing elevated levels of lead, however, it does not seem reasonable to suggest that cleanup of contaminated soils also needs to be carried out to this level. - suggest that soil cleanup guidelines remain at current levels - if the proposed "residential/parkland" soil cleanup guideline of 200 ppm can be justified, then the "agricultural" guideline should also be set no lower than 200 ppm. - recognizes that the soil guidelines are not levels to which it is acceptable to pollute soils, but rather reasonable levels to which contaminated soils should be restored to reduce environmental and health risks to an acceptable level. - setting ridiculously low guidelines such as the proposed 60 ppm (agricultural) could result in pressures to clean-up sites to a level that is not warranted and would provide little or no environmental benefit nor reduction in risks to human health. - increased risk to the environment or human health from lead in agricultural/residential/parkland soils at 500 ppm compared to 60 ppm is minuscule, however, the cost of reducing the lead content in contaminated soils to below 500 ppm compared to reducing it to less than 60 ppm could be substantial.
<p>Individual</p>	<ul style="list-style-type: none"> - like to see a province and nationwide moratorium on sewage sludge and paper sludge "amendments" to the land. - sent information/references regarding lead in sewage sludge for the Committee's review.

SOIL COMMENTS

Respondent	Summary of Comments
<p>Helen Henrikson The Little Cataraqui Environment Association Kingston, Ontario</p>	<ul style="list-style-type: none"> - raises concern about street cleaning. The dirt contains many harmful chemicals from tires and oil and is accessible to children. Questions whether the Ministries involved would study the issues and make recommendations to the municipalities that street cleaning should be prompt, particularly in the spring, and that the expense of prioritizing this preventative measure, good housekeeping, is eminently justified by probable improved health of children. LCEA assumes that the government will give high priority to this good housekeeping measure and emphasize that the finest particles in the last 5% of street dirt are the most contaminated. - the public should be informed about the dangers of some urban soils being highly contaminated with lead, even in residential areas and what measures they can and should take to protect their children, especially.
<p>Peter Hutton Conservator Society of Hamilton and District Inc. Hamilton, Ontario</p>	<ul style="list-style-type: none"> - questions why industrial soil level has not been changed given the concern for the workers who have and continue to work in plants on these soils. - should avail ourselves of the opportunity to reduce the presence of materials like lead in all soils and save ourselves problems and costs associated with clean-up later.
<p>Brett Ibbotson Angus Environmental Limited Don Mills, Ontario</p>	<ul style="list-style-type: none"> - questions whether cost implications for lowering soil guidelines and lowering the water objective have been treated equally. Has a more demanding attitude been applied to soil than water? Could the source of funding needed to achieve the proposed guidelines be an influence in determine which media need more stringent control?

SOIL COMMENTS

Respondent	Summary of Comments
<p>Brian Jantzi Blue Sky Research Oakville, Ontario</p>	<ul style="list-style-type: none"> - the lowering of agricultural level is a good move but perhaps this is too large a first step - would 100 ppm be a sufficient first step? - suggests setting a new residential standard of 200 ppm, but use the residential standard of 500 ppm to trigger surface soil clean-up. - setting a first goal of identifying and cleaning up urban residential soils exceeding 500 ppm would do more to reduce exposure to young children than implementing a lower "non-triggering" standard. - suggests that the cleanup level for these soils be 200 ppm and focusing on actually bringing > 500 ppm soils to 200 ppm would significantly reduce costs of providing maximum benefit to those currently most exposed. - 60 ppm may cause farmers undue hardship.
<p>Individual</p>	<ul style="list-style-type: none"> - needs to clarification as to depth for cleanup along with a clear rationale for the depth chosen. - the polluter must pay for the cleanup. - Ontario should put effort into developing remediation technologies and a process for evaluating and licensing technologies. - need a central place to hunt for information about a site, publicly accessible record for known contaminated sites as well as a record of what clean-up has taken place and a record of any contamination left on site. - suggests cleanup committee involving residents, developers and government officials. The public needs to be involved as early as possible in the cleanup process, even before the buildings are demolished. - need for dust control on abandoned or poorly maintained contaminated sites.
<p>Sidney Joseph Peto MacCallum Ltd. Toronto, Ontario</p>	<ul style="list-style-type: none"> - no mention is made on how the lead in the solid or liquid matrix is to be extracted, and ultimately measured.

SOIL COMMENTS

Respondent	Summary of Comments
<p>Ravi Kanipayor A & L Canada Laboratories East, Inc. London, Ontario</p>	<ul style="list-style-type: none"> - concerns about the proposed agricultural level of 60 ppm. - direct exposure of lead through soil is low with the exception of children. If this is the case, the exposure risk should be more of a concern in residential and parkland soils than in agricultural soils. Therefore, agriculture soils should have the same or higher level. - suggest the MOEE look into further study to evaluate the correlation between the total lead present in the soil and that available to plants and, based on the results of this study, implement the lead standards in soils. In the interim, adopt the same lead levels recommended for residential and parkland soils. - the socio-economic implications of lowering the level to 60 ppm may put many prime agricultural lands out of business.
<p>Individual</p>	<ul style="list-style-type: none"> - agrees with the recommendation to reduce the agricultural soil criterion for lead from 500 ppm to 60 ppm to protect food crops - suggests that MOEE and OMAF consider research to determine the degree of contamination that actually occurs in Ontario as it is difficult to predict and measure the amount of lead that is available in the soil for the crop to extract as well as the amount of lead a specific crop will extract from a specific soil. Joint research is needed to understand the relationships between quantity, form and uptake.
<p>Kyle Korneychuk Saskatchewan Environment and Public Safety Regina, Sask.</p>	<ul style="list-style-type: none"> - proposed changes to the Residential/Parkland and Agricultural limits are steps in the right direction and has data (range of lead <5-32 µg/g) to support agricultural limit. - questions why the industrial limit was not lowered. - the easiest contact with lead is in the workplace where dust may be inhaled, absorbed through the skin etc. - if lead was being produced/refined at a site, would it not serve the company's best interest to contain the material for profit? - since technology for the remediation of lead contaminated soils is not readily available, it makes sense to limit the levels at industrial sites even more as to prevent more contaminated sites from being created.

SOIL COMMENTS

Respondent	Summary of Comments
<p>Marlene Kramer Tiny Ratepayers Against Pollution Perkinsfield, Ontario</p>	<ul style="list-style-type: none"> - suggests that Industrial/Commercial guidelines should be lowered at this point in time to prevent costly cleanups in the future when plant closures occur and land is re-zoned and lead contamination is more likely to occur on Industrial/Commercial land, with resultant contamination of adjoining land.
<p>Individual</p>	<ul style="list-style-type: none"> - standards could be a sliding scale according to soil quality as determined by organic matter and mineral content, where the incorporation of lead into food during the growing process is an issue. This is due to the phenomenon that starving plants tend to pull up toxic metals where healthy plants leave the toxins in the soil. Likewise, the ingestion of lead into children's bodies seems also to be much greater if it occurs on an empty stomach rather than after a meal. - the commercial sector remain untouched under the guise of "socio-economic considerations". - many people perceive the mandate of the MOEE to protect the public from the externalization of costs from the commercial sector. These proposed standards do not fulfil that mandate. No industrial operation should be allowed to shut its doors without return soil on its grounds to community standards. - proposes a soil toxicity test as a requirement for land transfer so that large clean-up costs are not passed on to an unsuspecting buyer or force a developer to add these costs to housing costs. - to continue to allow industry to be subsidized by lower environmental standards is a big mistake, a mistake in which the clean-up costs will be borne by present or future public purse.

SOIL COMMENTS

Respondent	Summary of Comments
<p>S. Lauridsen Dupont Canada Inc. Maitland, Ontario</p>	<ul style="list-style-type: none"> - issues are complex with few, if any, simple solutions. - soil remediation should be driven by future use of site, access to the contamination, likely dispersion of contaminant by proposed future use and by remediation efforts, effects on groundwater. - suggests that we should not "drive ourselves to a zero-risk situation" and that there should be measurable benefits from these efforts. - feels the risk of removing, hauling and treating large tonnages of soil will at some point far outweigh the risk of simply leaving the contamination in-situ or encapsulating it to an extent that access is unlikely.
<p>Claude Laviolette City of Vanier Public Works Dept., Vanier, Ontario</p>	<ul style="list-style-type: none"> - City of Vanier brought together an Information Plan where residents were informed of the contaminants and were informed of the precautions and measures to take. Such information plan is delivered to the residents on a regular basis and at every spring between April 15th and May 15th before the start of the gardens and outside play season. - The guidelines for lead in soils being proposed at 200 ppm from a 500 ppm level will definitely increase the stringency of the criteria and will move some areas that had acceptable lead levels to levels that will be considered <u>not acceptable</u> if the new criteria is implemented. - economics surrounding possible de-contamination and the public concerns with the levels of contaminants versus the guidelines makes real estate development less likely to occur because of the high cost associated. - City of Vanier is concerned about the additional stringency of the recommended cleanup guidelines if a level of 200 ppm is implemented for soils within residential/parkland areas.
<p>Thomas Lynd The Corporation of the City of Windsor Windsor, Ontario</p>	<ul style="list-style-type: none"> - opposed to the reduction of the agricultural soil cleanup guideline for lead from 500 ppm to 60 ppm and provided rationale from the Commissioner of Works: (<i>See comments from G.T. Harding</i>)
<p>Wm. MacDonald Town of Huntsville Huntsville, Ontario</p>	<ul style="list-style-type: none"> - questions why a reduction in Industrial soils is not being proposed.
<p>Individual</p>	<ul style="list-style-type: none"> - indicated the proposed Industrial soil criterion should be lowered from 1000 ppm to 800 ppm.

SOIL COMMENTS

Respondent	Summary of Comments
Paul McCue City of Scarborough Scarborough, Ontario	<ul style="list-style-type: none"> - would like to see an addition to recommendation #4 to include: "Lead content in all manufactured soils such as composted material and any soils packaged or distributed in a manner indicating domestic garden use, be less than 60 ppm."
Individual	<ul style="list-style-type: none"> - inconsistency noted in changing the base rate in the analysis of soil guidelines for commercial and industrial from a child under the age of four years to a full grown adult which shows a manipulation of the numbers to suit the need of the document. - if the same base rate were used throughout the document, there may be a positive change in the guideline to better enhance the soil for the commercial and industrial sector
Individual	<ul style="list-style-type: none"> - object to blanket approach to lowering the acceptable soil levels for lead. - good and valid reasons for the proposed guideline values where there is the potential for exposure (i.e., agricultural, residential/parkland). - concept that is lacking is that of exposure. - guidelines should take into account the need to isolate the public from lead without requiring cleanup to the centre of the earth. - guidelines could be structured on the basis that a specific depth be cleaned up to the new stricter levels and that underlying materials be left in place provided that it can be demonstrated that hydrogeologic conditions are such that there is no migration to the surface. - On this basis, the industrial/commercial guideline would be adequate at a determined depth. Exposure might occur if the site were redeveloped and sites which were cleaned up to a certain depth could be flagged by registration of covenant on title to ensure that no significant redevelopment can occur without due provision made for soil quality.
Todd Pepper Corporation of the County of Essex Essex, Ontario	<ul style="list-style-type: none"> - has monitored groundwater and sediment at 3 landfill sites for 6 years from over 200 monitoring stations and, based on sediment data (the highest lead concentration was 33.5 ppm), supports the agricultural standard of 60 ppm.

SOIL COMMENTS

Respondent	Summary of Comments
<p>Claude Poirier-Defroy Canada Mortgage and Housing Ottawa, Ontario</p>	<ul style="list-style-type: none"> - not clear that the lowering of soil lead guidelines will lead to a significant reduced risk for those occupying dwellings on that soil. Lowering the guidelines will have major repercussions by reducing the number of sites available for affordable, inner-city house and increasing their cost. The Rationale does not provide a convincing argument that these increased costs will result in an improvement to the public health. - in-situ management options for soils are excluded and the need for remediation of soil > 500 ppm around existing dwellings is downplayed. - CMHC is not supportive of the changes proposed by MOEE. - unclear why a calculated health-based criterion has been used for the residential soil guideline and ignored for the agricultural and industrial soils. - unclear whether the industrial/commercial criteria is based on those most at risk in those settings (i.e, pregnant women, or women of childbearing age) - there is little substantive evidence that lowering lead levels in soil results in lower blood lead levels in children and cannot be justified by data from field research. - broader environmental costs associated with new residential guideline are very high since urban contaminated lands remain vacant and development spreads to suburban areas. - in-situ management and public education programs which target areas of high risk for lead in soil as a viable option for reducing lead exposure is not recognized and presented as an option to soil cleaning. - lowering the soil residential guideline to 200 ppm is costly and unwarranted given current research findings and the proposed approach fails to recognize important, cost-effective means of reducing exposure levels which represent alternatives to soil removal and cleaning. - not clear that the lowering of soil lead guidelines will lead to a significant reduced risk for those occupying dwellings on that soil. Lowering the guideline will have major repercussions by reducing the number of sites available for affordable, inner-city house and increasing their cost. The Rationale does not provide a convincing argument that these increased costs will result in an improvement to

SOIL COMMENTS

Respondent	Summary of Comments
<p>Michael Preudhomme Imperial Oil Sarnia Chemical Plant Sarnia, Ont.</p>	<ul style="list-style-type: none"> - proposed standards are acceptable with one concern in the area of soil standards. - problem will be encountered when naturally occurring background levels in the soil are greater than the proposed standards, even with an absence of manmade contamination. - proposed standards should address the issue of naturally occurring lead levels in soil which are greater than the standard concentrations.
<p>Mike Reid Site Remediation Inc. Etobicoke, Ontario</p>	<ul style="list-style-type: none"> - does not support a soil standard in the absence of a soil sampling and analysis protocol. There should be a specific sampling and analysis methodology as was in place when the original standard was adopted. - for example, one "Speck" of lead can yield 100% lead contamination in a speck-sized sample, yet negligible concentration in a larger sample (field protocol challenge). The laboratory analysis of "absolute" and "leachable" and other permutations must be specified to reflect accepted risks of exposure to the various forms of lead (lab protocol challenge).
<p>Patrick Reid Ontario Mining Association Toronto, Ontario <i>(On behalf of Canada Metal Company, Cominco Limited, Lac Minerals Inc., The Mining Association of Canada, Noranda Minerals Inc., and the Williams Operating Corporation.)</i></p>	<ul style="list-style-type: none"> - the Rationale Document fails to provide an adequate discussion of the technical and economic feasibility the revised soil clean-up it would have on the Province of Ontario. - (with respect to Recommendation #6 in the Rationale Document) there is no documentation to support the suggestion that keeping the soil quality in these areas (i.e., community or common areas) near rural background levels will provide any public health benefit. The technical and economic feasibility of maintaining these areas at rural background levels should be taken into consideration by the Rationale Document.
<p>Marsha Sheppard Atomic Energy of Canada Ltd. AECL Research Whiteshell Laboratories Pinawa, Manitoba</p>	<ul style="list-style-type: none"> - why the target concentrations are so low, <i>(sent two articles "The Development and Assessment and Remediation Guidelines for Contaminated Soils, A review of the Science" and "Performance of a Soil Model in Predicting Consequences of Smelter Emissions, including Abatement Scenarios".)</i>

SOIL COMMENTS

Respondent	Summary of Comments
Individual	<ul style="list-style-type: none"> - concerned that the pathways for lead could result in food production being a problem. - Table 13, page 65 source contribution from food is worrisome as soil contribution does not include exposure via backyard vegetable consumption. - as urban food production "catches on" quality is very necessary, therefore, supports the proposed changes to the standards for lead.
Individual	<ul style="list-style-type: none"> - concerned about the mobility of lead in soil. - if an industrial zone lies in a groundwater recharge area, the lead will migrate with the flow and contamination of drinking water sources and for plant uptake. - the probably of soil becoming airborne, contaminating neighbouring land has not been considered.
John Slobodzian Ministry of Transportation Downsview, Ontario	<ul style="list-style-type: none"> - lowering the acceptable levels of lead in soils has the potential to impact highway construction (grading) operations. The movement of earth materials "contaminated" with lead may have to go to certified landfills for disposal resulting in higher costs associated with landfill tipping fees and importing alternate earth materials. - all 3R materials must meet existing environmental standards and any reduction in the number of 3R options for managing excess construction and maintenance materials will result in more materials going to landfill, and the possibility of higher costs for management of these materials.

SOIL COMMENTS

Respondent	Summary of Comments
<p>Brenda Smith Ministry of Transportation Downsview, Ontario</p>	<ul style="list-style-type: none"> - MTO's Hazardous Waste Management program could be affected if changes were made to the Reg. 347, Schedule 4 leachate parameter for lead. It could mean changes to the way that MTO currently classified and registers waste such as contaminated soil, catchbasin cleanout material, spill cleanup material and spent structural steel blast media. Material that were Registered Solid could potentially become Leachate Toxic which would result in higher disposal costs. If decommissioning guidelines for lead were lowered, more waste would have to be managed resulting in higher costs for disposal. - if the parameter for lead is lowered under Reg. 347, Schedule 4, there could be an implication for the Transportation of Dangerous Goods program as more of the Leachate Toxic waste might have to be transported by MTO.
<p>Aine Suttle Citizens for a Safe Environment Toronto, Ontario</p>	<ul style="list-style-type: none"> - asks that ACES considers the hazardous impact of dust which can travel off contaminated sites and settle on to other sites. - suggests that a soil testing and cleanup plan be in place before buildings are demolished to reduce the amount of exposure to contaminated dust and unexpected problems. - suggests that information should be made available to the public and have the public involved in the clean-up process. - would like the government to force polluters to pay for the clean-up and ensure that sites are not abandoned. - suggests that contaminated sites should have signs prominently displayed to inform the public that it poses a health hazard, including a list of contaminants present and their health effects and where more information can be obtained. - clean-up technologies should be encouraged and a process should be created to evaluate technologies and to licence the users. - feels remediation is preferable over removal and disposal at contaminated sites.
<p>Robert Taylor Southern Georgian Bay District Fruit Growers Clarksburg, Ontario</p>	<ul style="list-style-type: none"> - questions why such a dramatic change in agricultural soils and requests information on implementation schedule.

SOIL COMMENTS

Respondent	Summary of Comments
<p>P. Toft, D. Phil Environmental Health Directorate Health and Welfare Canada Ottawa, Ontario</p>	<ul style="list-style-type: none"> - the allocation from soil should technically be divided between soil and house dust. In many cases, lead contamination of house dust does not arise so much from outdoor soils being tracked into the home, but from the flaking of lead-based paints from interior surfaces. OMOEE's apportionment over-estimate the contribution of soil to exposure and ultimately results in the derivation of an inappropriate soil guideline for parkland/residential areas. - no recommendation was proposed to reduce the risk of indoor lead exposure. An indoor dust guideline should be proposed that would allow public health officials a tool to advise parents and homeowners of situations presenting potentially unacceptable risks.
<p>Anthony Van Rossum The Corporation of the City of London London, Ont.</p>	<ul style="list-style-type: none"> - since soil is the largest source contributor (based on the stated allocations of lead load) believes that the industrial soil standard of 1000 should be lowered. Industrial sources of lead can be transported via clothes or windblown dust.

SOIL COMMENTS

Respondent	Summary of Comments
<p>Nicholas Vardin City of Toronto Department of Public Works and the Environment Toronto, Ontario</p>	<ul style="list-style-type: none"> - supplied lead data on soils from exposed areas in the City of Toronto which indicate that about 11% of the samples contained lead above the proposed standard of 200 ppm for residential land use. This 11% estimate is significantly lower than the 80% estimate used (p.35) to determine the total costs for residential replacement in the City of Toronto. - the proposed lead standard for soil should account for the buffering influence of surface soil and physical structures such as foundations and pavement. The proposed lead guideline of 200 ppm could be adopted for exposed surface soils only (i.e., 0.3 to 0.6 metres), thereby minimizing the anticipated increased costs associated with soil remediation. - in urban areas, it may not be practical to recommend that soil quality remain consistent with rural background levels as urban soils already have higher levels than urban and sources of atmospheric deposition continue to persist from industrial activity and dust resuspension. Periodically, communities would have to carry out soil replacement in playgrounds, baseball diamonds and sand boxes. The costs and benefits of implementing this recommendation should be determined. - a study assessing the recontamination rate of rural quality soils in urban residential areas may be beneficial.

SOIL COMMENTS

Respondent	Summary of Comments
<p>Wayne Wager Ethyl Canada Inc. Corunna, Ontario</p>	<ul style="list-style-type: none"> - points out a number of inconsistencies and points of clarification regarding interpretation of data. - costs associated with cleanup are significant and the question remains whether this money is well spent given the uncertainty of the benefits. - spending money on other factors such as nutrition, improved schooling and improved home life could yield measurable and enormously greater benefits. - even though the soil levels will not trigger cleanup, the general expectation will evolve that where there are soils exceeding the proposed guidelines, there is a probability of significant health effects which cause demands for costly clean-up. - the authors' attempt to convince readers that significant health benefits would be derived from soil clean-up to 200 ppm but when it comes to action, the authors are not persuaded by their own arguments. If significant benefits would really occur, they could not justify failing to mandate clean-up. <p>even to state the health benefits and failing to mandate clean-up is to cause psychological harm to parents worried about whether their children are at risk and how to pay for cleanup.</p>

SOIL COMMENTS

Respondent	Summary of Comments
<p>Wayne Wager (Cont'd) Ethyl Canada Inc. Corunna, Ontario</p>	<ul style="list-style-type: none"> - documents equate soil lead with dust lead, apparently due to the authors' belief that house dust lead levels are purely a function of soil lead levels. Research has shown that house dust has many sources, with lead-based paint probably being the most important. House dust remains a potential contributor during the winter. - documents mention lead in dust but it is discussed from a <u>concentration</u> (lead in a given amount of dust) view point rather than dust lead <u>loading</u>, which is a measure of the amount of lead in a given area. Loading is a better indicator of available lead than is concentration. Studies have indicated that the amount of lead on children's hands was more closely related to dust lead loading than to dust lead concentrations. - lowering the residential guideline while ignoring the effect of house dust would greatly miss the target. - studies have indicated that the relationship between soil lead and blood lead is inconsistent (cites US EPA funded study and South Riverdale) and a number of authors have acknowledged this. - based on results of the Three City Study and the South Riverdale project, lowering residential soil lead levels from 500 to 200 ppm would have no measurable effect on blood lead levels. - need for standardized sampling, preparation and analytical procedures, depth to which sampling should occur, type of sampling instrument to be used and the number of and type (e.g., composite) of samples taken.

SOIL COMMENTS

Respondent	Summary of Comments
Individual	<ul style="list-style-type: none"> - the new standards move us away from a standard which is consistent across the board. - it doesn't help to make residential and agricultural standards ever more elusive - one argument for lowering industry levels at least as much as the others have been lowered. - no compelling ethical, moral, financial or other reason to treat industry as a special case forever. - cannot isolate industrial pollution since we know about how connected things are (e.g., residential areas that share borders with industrial lands) - believes that every person living in these borderlands, or working in industrial areas and coming home have every right to expect the same health protection as others. - doesn't think that soil standards should be oversimplified. - the fact that only one drinking water standard strengthens the argument for one soil standard. - hoping that the old standards were also sufficient to protect our health. - does not want to continue to pay for clean-up of industrial wastelands, as a taxpayer. - suggests a regulation that clearly leaves the clean-up bill to the perpetrator and beneficiaries (stakeholders, workers etc.). - most sensible enterprises would respond by quickly lowering contamination at the source, so that expensive after-the-fact clean up is avoided.
Paulos Youakim Environment Canada Burlington, Ont.	<ul style="list-style-type: none"> - reduction of 1 % for the 1000 ppm industrial standard is better than no reduction at all. - 60 ppm for agricultural soil may be hard to achieve.

DRINKING WATER COMMENTS

Respondent	Summary of Comments
Ivan Betcherman Ingot Metal Company Ltd. Weston, Ontario	<ul style="list-style-type: none"> - suggests "FEDERALLOY 1" (which contains bismuth) as an alternative to leaded brasses for plumbing fixtures. - feels that elimination of lead in plumbing materials should be enforced through amendments to the plumbing code. <i>(provided product information and example of "Warning" label from California.</i>
Individual	<ul style="list-style-type: none"> - suggests that the ODWO be designated "interim" until more data are collected on the actual lead levels - in reference to Recommendation 2 (pp. 48-49), clarification of the terms "greatly exceed" and "areas of high risk" should be provided - some of the data presented in Table 6 (p. 42) are misleading as: i) the USEPA Action Level of 15 µg/L is triggered when just 10% of standing samples from high risk locations exceed this concentration; ii) the source of the USEPA "Recommended MCL based on a long-term health advisory" of 20 µg/L is not provided (suggests the original MCL proposed by EPA was 5 µg/L); and iii) the action level for lead in all community supplies of drinking water in the US (including NY State) is 15 µg/L in standing samples at the tap.
Bruce Brown Wastestreams Engineering Limited Toronto, Ontario	<ul style="list-style-type: none"> - no objection to retaining the current Ontario Drinking Water Objective for lead.
Eric Carruthers University of Toronto Environmental Coalition and/or Diverse Visions Environmental Research and Services Toronto, Ontario	<ul style="list-style-type: none"> - greater responsibility should be taken listening to tenants complaints and ensuring landlords keep plumbing systems in good repair. Plumbing systems should be upgraded to eliminate lead components.
Individual	<ul style="list-style-type: none"> - finds the proposed standard unacceptable based on the fact that most acceptable levels have decreased by 50%. - no rationale is given for the lack of a decrease. - suggests that the acceptable level for lead in drinking water be decreased to a maximum of 6 ppb to march the decreases in the other elements.

DRINKING WATER COMMENTS

Respondent	Summary of Comments
<p>Gordon Earle Environmental Studies at Large Peterborough, Ontario</p>	<ul style="list-style-type: none"> - proposes that the ODWO be revised to 5 ppb lead which will reduce the contribution of lead from the source water leaving the water treatment facility and be in line with health-based criteria. - reducing lead at source must be conducted in conjunction with some other form of control technology such as the replacement of lead service lines and pipes, flushing lines of standing water, and controlling the corrosiveness of water. - MOEE should endorse an ODWO of 5 µg/L following the U.S. initiative of working toward a goal of zero contamination level in drinking water. - MOEE should endorse an amendment to the Ontario Plumbing Code which would eliminate lead entirely from solder used in potable water systems. - MOEE should endorse the placement of warning labels on plumbing fixtures which contain lead.
<p>Richard Frank Guelph Field Naturalists Guelph, Ontario</p>	<ul style="list-style-type: none"> - surprised that the lead levels in drinking water were not reduced as the background levels in uncontaminated waters are well below 10 µg/L.
<p>J. Fraser Windsor Utilities Commission Windsor, Ontario</p>	<ul style="list-style-type: none"> - the proposed ODWO is a practical standard at this time and concurs with the proposal of this level. - encourage Municipalities to further reduce lead content by treating water and removing metals on site rather than allowing waste water to enter sewage systems and local rivers. - removal of lead service lines, use of lead free solder drinking water service line connections and flushing of water lines before drinking will greatly reduce risks to human health. - Windsor is replacing existing services and mains with PVC and concrete lined piping and is investigating alternative primary coagulants in order to prevent excessive depression of the pH valve and corrosive potential of the drinking water supply.

DRINKING WATER COMMENTS

Respondent	Summary of Comments
<p>Hershel Guttman Ontario Section, American Water Works Association Toronto, Ontario</p>	<ul style="list-style-type: none"> - advocates "all reasonable efforts to improve drinking water quality and to set drinking water standards based on a balanced evaluation of documented health effects research, demonstrated treatment techniques, and cost considerations." - AWWA supports the Rationale document on its findings that where effective reductions in lead controls strategies cannot be attained through corrosion control measure, the technology required to remove the lead would result in costs far exceeding those cited. - AWWA supports the recommendation that potential costs for corrosion control or lead removal be carefully reviewed prior to revising the ODWO for lead and the benefits should exceed the costs. - AWWA does not oppose sampling at the tap but has great concerns over compliance at the tap and wishes to ensure that any requirements are practical. - MOEE data that is presented in Appendix A is difficult to interpret and not attempt is made to explain large variances between standing and flushed samples. - AWWA supports that the use of a treatment technique only be triggered only as necessary by the water supplier after "diagnostic monitoring" has indicated that the lead level has been exceeded and corrosion control is warranted for the water supply as a whole. - AWWA is supportive of optimized corrosion control as opposed to corrosion control to minimize lead levels and that a balanced approach to all treatment regimes be implemented. It may not be practical for an entire water system to alter chemical treatment in order to suit the consumers' plumbing. - the document did not expand on the extent of the drinking water survey required. AWWA offers its assistance in preparing such as survey. - there is no reference to any studies that show a correlation between health effects and lead levels in domestic water supplies. Cites a study that found no evidence of higher blood lead in area of London, Ontario serviced by lead water pipes had higher blood levels than children in areas of the city not serviced by lead pipes.

DRINKING WATER COMMENTS

Respondent	Summary of Comments
Helen Henrikson The Little Cataraqui Environment Association Kingston, Ontario	<ul style="list-style-type: none"> - Table 7 is very important and should be published in the media with an article, or series. It especially shows what the individual can do by flushing out the standing pipe water. - the importance of the distribution system in contaminating good source water must be recognized in preventative medication.
D. Hosie Toronto Board of Education Toronto, Ontario	<ul style="list-style-type: none"> - has no concerns with the propose value for drinking water.
Brian Jantzi Blue Sky Research Oakville, Ontario	<ul style="list-style-type: none"> - agrees with Recommendations 7-10 but suggests adding a recommendation that lead pipe and lead solder contaminated pipe be replaced at every practical opportunity.
Individual	<ul style="list-style-type: none"> - suggests that it be mandatory to have small holes in all copper fittings for more controlled application of solder when connecting these fittings, to reduce excess solder exposed to drinking water.
Sidney Joseph Peto MacCallum Ltd. Toronto, Ontario	<ul style="list-style-type: none"> - In water, is the lead filtered? If so, what size filter paper under what conditions? Alternatively, is it soluble lead, non-soluble lead or total lead?
Individual	<ul style="list-style-type: none"> - suggests that the recommendation for municipalities work with the MOEE to undertake a comprehensive drinking water survey to assess corrosivity is, perhaps, an extreme measure. Since pH and dissolved solids are key factors in corrosivity and are well known and understood in the engineering community, he suggests that MOEE use its existing monitoring data to predict which water supply systems need corrosion control. - justification as to the choice of 10% as a level of significance needs to be provided in reference to the statement "Where results indicate that greater than 10% of flushed samples are in excess of 10 µg/L, municipalities implement appropriate measures to control the corrosiveness of water". - heartily agrees with the recommendation that schools maintain a consistent and regular flushing and monitoring program.

DRINKING WATER COMMENTS

Respondent	Summary of Comments
Individual	<ul style="list-style-type: none"> - no proof that lead is harmful in drinking water based on his family's history of consumption of water from a solid lead suction pipe and their long life spans. - hopes that a study on this will confirm his conclusions.
Marlene Kramer Tiny Ratepayers Against Pollution Perkinsfield, Ontario	<ul style="list-style-type: none"> - feels that the Ontario Drinking Water Objective needs to be reduced, if at all possible, as drinking water is the most likely source of lead contamination.
Joyce McEwan N.C.M.W.M. Grimsby, Ontario	<ul style="list-style-type: none"> - questions lead levels in drinking water derived from wells (dug and drilled), in "roof water" (i.e., from cisterns that are filled from eaves troughs), and in rain water and stream water which is used to water local produce. - questions how much lead could get into vegetables and fruits from contaminated rain water. - supports all efforts to improve drinking water quality.
Individual	<ul style="list-style-type: none"> - due to the concentration (up to 500%) of lead in standing water overnight, municipalities should be required to provide permanent constant flowing taps at the most gradiently remote points of their waterworks systems.
Eva Nichols Learning Disabilities Association of Ontario Toronto, Ontario	<ul style="list-style-type: none"> - use of several terms (e.g., standards, guideline, objective) for drinking water is confusing and problematic. - 10 ppb might be acceptable for drinking water IF it were a standard not an objective. - the objective should be the desirable health based criterion. - agree with all recommendations concerning drinking water, however, it is unclear how these will be instituted.
Individual	<ul style="list-style-type: none"> - some essential points are left out of the document such as: Do all the pipes have to be flushed individually? What is the standard time limit for water is left standing in pipes? Is the water for showering, washing clothes or dishes dangerous to the human body?
Todd Pepper Corporation of the County of Essex Essex, Ontario	<ul style="list-style-type: none"> - has been monitoring groundwater and sediment at 3 landfill sites for 6 years at 200 monitoring stations and suggests that the proposed standard of 0.01 mg/l seems to be a reasonable limit based on historical data base.

DRINKING WATER COMMENTS

Respondent	Summary of Comments
James Reffle Middlesex-London Health Unit London, Ontario	<ul style="list-style-type: none"> - rationale document needs to elaborate more on specific methods for conserving flushed water being drawn off in schools. - assessment of flushing practices at schools can be undertaken by local health units.
Ray Robinson Ridgetown Public Utilities Commission Ridgetown, Ont.	<ul style="list-style-type: none"> - current/proposed standard is acceptable (there is no such thing as zero) and there is insufficient evidence to justify the costs to the end user. - priority in the use of the dollar must be of utmost importance - questions how many deaths can be directly attributed to current lead levels compared to diabetes, drugs or aids.
Romko Rysyk Etobicoke Gas Appliance Service Inc. Etobicoke, Ontario	<ul style="list-style-type: none"> - the proposed standards are not acceptable - other communities (e.g., California) have strict laws regarding the use of lead in drinking water systems including lead content in brass fittings and brass fixtures - suggests that California "lead in drinking water systems" legislation should be investigated in addition to what other communities have done. <p><i>(requested information on upgrading old drinking water systems which have used lead solder or lead content fixtures.)</i></p>

DRINKING WATER COMMENTS

Respondent	Summary of Comments
Individual	<ul style="list-style-type: none"> - concerned with the proposal to retain the ODWO at its present level of 10 µg/L. - USEPA proposed setting the MCL of 5 µg/L following treatment, along with tap monitoring and treatment requirements if lead levels registered high. It is important for Ontario to follow their example. - the hazard of lead in infant formula seems to be a topic of grave interest to scientists. The largest daily quantity of water per unit of body weight is ingested by infants who are fed reconstituted formula (68% of parents recently visited a hospital), a population not considered in the study. - three hazardous practices in preparing formula are: the use of water that is the first drawn in the morning, excessive boiling of water, and inadvertent use of lead-based kettles for boiling. - understandable education is the most effective tool but hospital cutbacks and shortening of patient stays are two strikes against the mother receiving this vital information. - despite our present knowledge, there is insufficient toxicological tests to substantiate leaving the drinking water objective alone. - it is important to determine whether synergistic effects occur in the presence of other compounds. - mode of action, bioconcentration, bioaccumulation (as it pertains to consumption of food) are not completely understood or outlined in the document. - low-dose sources of lead must be reexamined, including lead in drinking water. - mobility in groundwater and contamination of groundwater from soil are not considered. Rural citizens may have their water supply contaminated by adjacent land plots. - the document should indicate if the proposed values apply to water at the treatment plant or point of destination. - the only foreseeable conclusion includes lowering the ODWO to match the USEPA value of 5 µg/L and provide funding for education and research.
J. Taylor Elgin St. Thomas Health Unit St. Thomas, Ontario	<ul style="list-style-type: none"> - believes that it is important that measurable and meaningful levels should be established for any material found in drinking water which my adversely affect the public's health.

DRINKING WATER COMMENTS

Respondent	Summary of Comments
<p>P. Toft, D. Phil Environmental Health Directorate Health and Welfare Canada Ottawa, Ontario</p>	<p>- the Federal-Provincial Subcommittee on Drinking Water (on which Ontario is represented by an official from OMOEE) has recently established 10 µg/L as the Canadian drinking water guideline for lead. This was based on the WHO Provisional Tolerable Weekly Intake for lead equivalent to a TDI of 3.5 µg/kg bw per day, for infants and children, which indicated a value of 8 µg/L, with an adjustment to 10 µg/L for risk management considerations.</p>
<p>Nicholas Vardin City of Toronto Department of Public Works and the Environment Toronto, Ontario</p>	<p>- proposed water standard is acceptable</p>

AIR QUALITY CRITERIA COMMENTS

Respondent	Summary of Comments
Bruce Bigham C. Bruce Bigham Consulting Deep River, Ontario	- 30 day air value should perhaps be lower than the $0.7\mu\text{g}/\text{m}^3$ recommended due to contamination of agricultural soils.
Bruce Brown Wastestreams Engineering Limited Toronto, Ontario	- no objection to creating more stringent standards air quality, since ingestion of lead from airborne sources is a very direct exposure pathway, especially important with respect to workplace occupational health concerns.
Karen Diakun South Riverdale Community Health Centre Toronto, Ontario	- support changes to the air standards, given that there is a relationship between the amount of lead in the air and lead in blood.
James Dorey Ministry of Transportation Downsview, Ontario	- lowering air standards has the potential to impact MTO's highway maintenance program, in particular, Structural Steel Coating Rehabilitation (SSCR). SSCR involves the removal/replacement of coatings (paints) from steel structures that are rusting, through abrasive blasting. Technologies to achieve compliance with existing legislation are expected to add 10-30% to the costs of SSCR and may not be effective 100% of the time. Lower lead standards have the potential to substantially increase the cost of SSCR operations.

AIR QUALITY CRITERIA COMMENTS

Respondent	Summary of Comments
<p>Gordon Earle Environmental Studies at Large Peterborough, Ontario</p>	<ul style="list-style-type: none"> - the 30 day standard of $0.7 \mu\text{g}/\text{m}^3$ represents a 93% increase over the amount of lead which would have been added to the soil if a desirable health-based criterion (i.e., $0.05 \mu\text{g}/\text{m}^3$) were adopted. - four criticisms with MOEE's approach to deriving standard; i) model-based standard does not take into account inter-media transfer of lead, particularly to soil and dust, ii) revised standard will effect only a single relatively small industry among a multitude of industries emitting lead into the atmosphere (i.e., secondary lead smelters emit less than 2 % of annual Ontario lead emissions), iii) an ambient air quality standard has no effect on the long-range transport of lead, iv) fugitive emissions are not dealt with. - MOEE's approach is in effective in reducing the effect of 323.87 tonnes/year of lead emissions on human and non-human life and, in fact, it can be expected that the concentration of lead in soil, dust, water and sediment will continue to increase with time, although at an admittedly slowed place due to the phase-out of leaded gasoline. - suggests that it would be prudent to adopt a series of "lowest achievable emission rate" (LAER) derived air quality standards which address emissions on a chemical-by-chemical and industry-by-industry basis and involve "pre-stack" controls - if emission standards are to be defined by performance limits met by BAT then the MOEE, not industry, should determine what technology is the best available. BAT should be interpreted as the most reliable and effective technology available in the world, without regard to considerations such as cost. - regulatory measures need to be introduced which would control fugitive emissions of lead.
<p>Richard Frank Guelph Field Naturalists Guelph, Ontario</p>	<ul style="list-style-type: none"> - questions whether the air quality criteria are for indoors and outdoors. - questions what levels of lead can accumulate around a plant in 10 years.

AIR QUALITY CRITERIA COMMENTS

Respondent	Summary of Comments
<p>Frederick Gerson F.T. Gerson Ltd. Toronto, Ontario (representing Local 9042, United Steelworkers of America, District 6, and Tonolli Canada Ltd.)</p>	<ul style="list-style-type: none"> - in summary, imposition of the $0.7 \mu\text{g}/\text{m}^3$ standard, far from benefitting the Public, would damage the environment, contribute to increased lead contamination, destroy several thousand jobs throughout the Province and would threatened the viability of a company which, during almost forty years of continuous operation in the community has provided permanent and well paid employment to a devoted workforce. - the parties urge ACES to consider the establishment of any new standard in relation to its effect on the continued viability of Tonolli's operations in Mississauga and the damage to the environment, the economy and especially the workforce which would result from impairing that viability. - propose that the new standard be set at a 90-day arithmetic mean of $1.5 \mu\text{g}/\text{m}^3$ which not only equals the strictest standard in force in the U.S. but is also stricter than the current Ontario, 30-day standard of $3.0 \mu\text{g}/\text{m}^3$. The Tonolli facility should be able to achieve compliance with this proposed standard without unduly impairing its continued operations and it is imperative that the Ontario standard not be any stricter than that prevailing in the U.S., lest low cost lead units be drained away to the U.S. where lower standards permitted lower cost operations. - if it is impossible for ACES to recommend the proposed 90-day standard, then we urge them to consider suggesting that the Tonolli facility be made subject to a permanent variance under a stricter standard, permitting within a carefully delineated area a 90-day arithmetic mean of $1.5 \mu\text{g}/\text{m}^3$. Permanent variance has been successfully in force in several jurisdictions in North America and has particular relevance to an air quality standard for a secondary lead smelter because of the relatively high specific gravity of lead which restrains its distribution of particular lead in the atmosphere. Based on investigations conducted, it would appear reasonable that a stricter standard prevailing outside the area subject to the permanent variance would not be compromised.

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<p>Helen Henrikson The Little Cataraqui Environment Association Kingston, Ontario</p>	<ul style="list-style-type: none"> - the prediction of future soil lead concentrations of 520 ppm in 50 years with a standard $0.05 \mu\text{g}/\text{m}^3$ is very revealing and shows the cumulative effect of apparently minor amounts to the doubters. - the demonstration of how a good corporate company Tonolli, takes measures in monitoring and prevention of lead emissions should be recognized publicly as a success story what is possible and is being done.
<p>D. Hosie Toronto Board of Education Toronto, Ontario</p>	<ul style="list-style-type: none"> - has no concerns with proposed values for air - Ambient Air Quality Criteria.
<p>Brett Ibbotson Angus Environmental Limited Don Mills, Ontario</p>	<ul style="list-style-type: none"> - if the air pathway results in less than 1% of exposures, why bother to implement more stringent criteria on that component?
<p>Brian Jantzi Blue Sky Research Oakville, Ontario</p>	<ul style="list-style-type: none"> - agrees in general with Recommendations 11 and 12, but these measures are surrogates for what is really of interest: deposition. Concentration-based units would be the best measure if the inhalation pathway of exposure was significant. - the real concern is the soil ingestion pathway with the transport route: deposition from air - an ambient deposition (i.e., loading) criterion would represent a better direct performance measure and deposition monitoring stations are "lower tech", lower cost than Hi-Vol systems for concentration monitoring. Therefore, more monitors could be employed. - suggests that 30-day and annual deposition standards be developed instead of concentration-based standards. These standards would better control and demonstrate reduced deposition to soil and avoid the need to make assumptions about how concentration relates to deposition.
<p>Individual</p>	<ul style="list-style-type: none"> - suggests that sources of lead from long-range transport of air pollutants be an area of attention in the future.

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<p>Patrick Reid Ontario Mining Association Toronto, Ontario <i>(On behalf of Canada Metal Company, Cominco Limited, Lac Minerals Inc., The Mining Association of Canada, Noranda Minerals Inc., and the Williams Operating Corporation.)</i></p>	<ul style="list-style-type: none"> - (with respect to Recommendation #11 in the Rationale Document) the Rationale Document needs to provide additional evidence that reducing the ambient air standard to $0.7 \mu\text{g}/\text{m}^3$ will provide a public health benefit, especially in light of the fact that the blood lead levels of children residing near point sources in Toronto have been found to have mean blood levels below the level of concern. - it is not at all clear in reviewing the rational Document that any health benefit will be achieved for the residents of Ontario if the new air and soil guidelines are adopted.since there would be no children living on lands that have not been decommissioned none would benefit from the implementation of the guidelines. The value of $0.7 \mu\text{g}/\text{m}^3$ is currently the level being achieved around a single point source in the province and therefore would not reduce the exposure to the children residing near the smelter. - with respect to cross-contamination of nearby residential/parkland sites from industrial sites, less costly remediation techniques should be considered that can also effectively eliminate this potential concern.
<p>Individual</p>	<ul style="list-style-type: none"> - air quality standards have been neglected in Ontario, a multi-media approach is commendable but enforcement must be an integral part of the process.
<p>Anthony Van Rossum The Corporation of the City of London London, Ont.</p>	<ul style="list-style-type: none"> - questions why the air standard in decreased by 50% when it only contributes to less than 1% of the lead load.
<p>Nicholas Vardin City of Toronto Department of Public Works and the Environment Toronto, Ontario</p>	<ul style="list-style-type: none"> - the proposed air standards are acceptable

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